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IN THE

Supreme Court of the United States

October Term, 1973

No. 73-1893

BLOHM & VOSS AG,
Petitioner,

v.

PRUDENTIAL-GRACE LINES, INC.,
Respondent.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

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Dated: June 19, 1974

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BLOHM & VOSS AG,

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PRUDENTIAL-GRACE LINES, INC.,

Respondent.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

The petitioner, Blohm & Voss AG, prays that a writ of certiorari issue to review the judgment and opinion of the United States Court of Appeals for the Fourth Circuit entered in this proceeding on December 6, 1973. This judgment reversed the judgment of the United States District Court for the District of Maryland entered on November 13, 1972.

Opinions Below

The opinion of the United States Court of Appeals for the Fourth Circuit (A* 1a-39a) is reported at 489 F.2d 231; 180 U.S.P.Q. 165.

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* The Appendices which accompany this Petition are presented in a separate volume of larger size so as to enable reproduction of patent documents (Rule 39). The Appendices are referred to by the capital letter of the respective Appendix followed by the page number of the Appendix volume.

The opinion of the United States District Court for the District of Maryland (B 40a-107a) is reported at 346 F. Supp. 1116; 174 U.S.P.Q. 484.

Blohm & Voss' petition for rehearing was denied by the United States Court of Appeals for the Fourth Circuit on March 22, 1974, without opinion.

Jurisdiction

The judgment of the United States Court of Appeals for the Fourth Circuit was entered on December 6, 1973 (C 108a). A timely petition for rehearing *en banc* was denied on March 22, 1974 (D 110a), and this petition for a writ of certiorari was filed within 90 days of that date.

The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1).

Questions Presented

1) Does a federal appellate court violate due process by denying a party the right to be notified and heard on evidence outside the record, which the court, without the parties' knowledge, gathered and relied on in its opinion?

2) Does a federal appellate court violate the rules of appellate review by independently and on its own initiative gathering and relying on evidence outside the record?

3) Does a federal appellate court violate the rules of appellate review including prior holdings of this Court and Rule 52(a) F.R.C.P. by conducting a *de novo* factual inquiry, involving the independent gathering and consideration of evidence not in the record?

4) Does a federal appellate court violate this Court's prior decisions and Rule 52(a) F.R.C.P., by setting aside findings of fact without a showing that they are clearly erroneous and by replacing them with clearly erroneous findings while imputing findings to the trial court which it did not make?

5) Did the conduct of the majority of the court below so far depart from the accepted and usual course of judicial proceedings as to call for an exercise of this Court's power of supervision to prevent a grave miscarriage of justice?

Constitutional and Statutory Provisions and Rules Involved

This case involves the Due Process Clause of the Fifth Amendment of the Constitution of the United States, Rule 52(a) of the Federal Rules of Civil Procedure, and Section 103 of Title 35 of the United States Code (E 111a-112a).

Statement of the Case

This is a case of first impression. No reported case has been found in which, as here, a federal appellate court travelled hundreds of miles, gathered new factual evidence detrimental to one of the parties without the parties' knowledge and on its own initiative, utilized this evidence in reversing the judgment of the district court and denied the losing party a hearing on the new evidence.

Petitioner Blohm & Voss AG, a West German ship builder and the owner of the patent in suit, brought this patent infringement action against respondent Prudential-Grace Lines, Inc., in the United States District Court for the District of Maryland under 35 U.S.C. Sections 271 and 281. Jurisdiction of the district court was grounded on 28 U.S.C. Section 1338(a).

The patent (H 130a) is directed to ship's loading and unloading apparatus, commonly known as "cargo gear," in which a single boom is pivotally mounted on the deck of the ship between a forward and an aft hatch and is capable of selectively serving either hatch without re-rigging. The accused structure is *inter alia* installed on respondent's Santa Lucia class of ships.

Due to its simplicity, both in respect of handling and construction, and its capability to lift exceptionally heavy loads, the patented cargo gear satisfied a long felt need and has enjoyed outstanding worldwide commercial success. It has been installed on some 500 ships and has effectively dominated the heavy lift cargo gear field ever since. Corresponding patents have been granted in numerous other countries, including the notoriously "tough" examination countries such as The Netherlands, Denmark, Sweden, Norway, Japan, West Germany and Great Britain.

During twenty days of trial, creating over 2800 pages of testimony transcript, the trial judge heard extensive testimony from expert witnesses and observed the demonstration of several models of the structures involved. The many questions asked by the trial judge reflected his attention and understanding. Three motion pictures of commercially installed cargo gear were shown. Actual shipboard demonstration of lifting cargo by installed gear took place.

The district court adjudged several claims of the patent both valid and infringed. Respondent's contention of obviousness was specifically rejected. The lengthy opinion of the district court (B 40a-107a), annotated in a most detailed way to the trial record, provides substantial evidentiary support for virtually every finding.

Respondent appealed from the district court's judgment to the Court of Appeals for the Fourth Circuit. The record on appeal exceeded 4500 pages.

The court of appeals reversed—two to one—on a finding of obviousness. The majority opinion (A 1a-39a) ignored many of the well-reasoned and annotated findings of the district court. Instead, it based its conclusions on its own *de novo* factual inquiry. As is apparent from Chief Judge Haynsworth's letter of January 21, 1974—reproduced in Appendix F (F 113a-116a)—this inquiry included the following:

> (a) Judge Widener—the author of the majority opinion and a graduate of the U. S. Naval Academy—and his law clerk drove to the Mariners Museum

in Newport News—which is about 380 miles from Abingdon, Virginia where Judge Widener has his chambers and about 74 miles from the courthouse in Richmond, Virginia;

(b) "They spent a little while looking at ship models and several hours searching for and reading articles found principally in periodicals in the public library maintained in the museum" (F 113a);

(c) Photocopies were made and retained of some of the articles Judge Widener had read (F 113a);

(d) During the conference on the case the following day in Alexandria, Virginia, Judge Widener showed the photocopies to the other two judges on the panel (F 114a-115a);

(e) Two of the articles are cited in the majority opinion (F 115a; A 13a-14a).*

These articles are not included in the Appendix because they were not part of the record before the appellate court.

The majority went far beyond what respondent had urged on appeal in respect of obviousness. While respondent thus solely relied on the Lehmann '222 patent (K 136a), the majority considered four additional prior art references of record, the two articles referred to in Chief

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* The majority opinion considers the following *three* prior art publications which are not part of the record on appeal:

(1) *Steel's Elements of Mast Making, Sailing and Rigging* (A 13a);

(2) *British Standards Institution* publication (A 13a); and

(3) *Notebooks of Leonardo da Vinci* (A 13a-14a).

In addition, *Webster's New International Dictionary, 2nd Edition,* is mentioned. It is noted that Chief Judge Haynsworth's letter refers to but two of the publications. It has not been established where the third publication was located by the majority.

Judge Haynsworth's letter (F 113a-116a) and the two further publications outside the record, all "with a startling lack of specificity of precisely what in the prior art made the Sprengel invention obvious" (Dissent A 32a).

The dissenting judge criticized the majority for "the breadth of the opinion's consideration of the prior art" which is in contrast "with the sole ground of obviousness urged on us in this appeal" (A 32a). The dissenting opinion thus stated:

> "Of course, an appellate court may decide an appeal on the basis of anything *in the record* whether urged by counsel or not. But in the field of patent law, where our experience teaches us that the professional patent bar generally is in possession of more expertise than the average judge who is called upon to decide a patent case, I am loath to decide a case on the basis of contentions not advanced by counsel without, at least, inviting the comments of counsel on what may seem to us to be determinative considerations not advanced in presentation of the appeal." (emphasis added) (A 33a)

The *de novo* interpretation of the prior art advanced by the majority contains technical errors which in turn engendered erroneous findings. The most serious errors were pointed out in Blohm & Voss' petition for rehearing which is reproduced in Appendix G (G 117a-129a). The prior art references discussed in the petition for rehearing are reproduced in Appendices I through L.

As set forth in the petition for rehearing (G 126a), in only two instances did the majority conclude that the district court had made an erroneous finding. In one of those instances the majority imputed a finding to the district court which it had not made and hence could not be erroneous. The other finding was based on a clearly erroneous assumption by the majority of what the district court understood. The dissenting judge thus stated "this is not a case where the district court's factual finding of non-obviousness is clearly erroneous" (A 33a).

REASONS FOR GRANTING THE WRIT

I.

Petitioner has been deprived of due process by the appellate court's consideration of the new evidence without notice and hearing.

> "The fundamental requirement of due process is an opportunity to be heard upon such notice and proceedings as are adequate to safeguard the right for which the constitutional protection is invoked." *Anderson Nat. Bank* v. *Luckett,* 321 U.S. 233, 246; *Pennoyer* v. *Neff,* 95 U.S. 714, 733; *Scott* v. *McNeal,* 154 U.S. 34, 46; *Blackmer* v. *United States,* 284 U.S. 421, 438.

The key elements of due process have not been satisfied here. Certainly, petitioner was not notified of the discovery of the new evidence, let alone that it would be relied on by the majority. Moreover, at no time was petitioner given an opportunity to be heard on this new evidence. Indeed, Blohm & Voss' petition for rehearing was denied.

Blohm & Voss, although an alien corporation, is nonetheless entitled to due process. "An alien has the same protection for his property under the Due Process Clause as is afforded to a citizen." *Galvan* v. *Press,* 347 U.S. 522, 530; *Home Ins. Co.* v. *Dick,* 281 U.S. 397, 411.

Petitioner has thus been deprived of its property in a manner which is manifestly contrary to the requirements of the Due Process Clause of the Fifth Amendment.

II.

The court below violated prior holdings of this Court by independently obtaining and relying on evidence not in the record before it.

The deliberate search for new evidentiary material by an appellate court and the introduction of the results of the search into the majority opinion are clearly in conflict with the rules of proper appellate review as established by this Court.

As early as 1833, this Court enunciated the doctrine that "[n]o evidence can be looked into in this court, which exercises an appellate jurisdiction, that was not before the circuit court," *Holmes* v. *Trout,* 7 Pet. 171, 210. This doctrine was reiterated two years later in *Mitchel* v. *The United States,* 9 Pet. 711, 731, where this Court stated:

> ". . . because in an appellate court no new evidence could be taken or received without violating the best established rules of evidence and law. Under such circumstances, it would be dealing to the petitioner a measure of justice incompatible with every principle of equity, to visit upon his title an objection which he was not bound to anticipate in the court below, which he could not meet there and which this court were compelled to refuse him the means of removing by evidence."

Again, the following year in *Boone* v. *Chiles,* 10 Pet. 177, 208, the Court emphatically rejected the suggested reliance on "any paper" that was not used during trial. The pertinent passage of the opinion thus declares:

> "[W]e must be distinctly understood, as clearly of opinion, that it is not admissible by the rules of appellate courts; who can act on no evidence which was not before the court below, or receive any paper that was not used at the hearing."

This doctrine has been the unchallenged standard of the Land ever since. There can be no doubt here that the majority below has violated this standard.

It is further clear that the publications adduced by the majority were actually considered and relied upon in the majority's determination of the question of obviousness:

> (1) This Court in *Graham* v. *John Deere Co.,* 383 U.S. 1, 17, stated that "the § 103 condition (non-obviousness) . . . lends itself to several basic factual inquiries." The first inquiry suggested by the Court is that "the scope and content of the prior art are to be determined." The Court then concluded: "Against this background, the obviousness or non-obviousness of the subject matter is determined." Here the majority considered the publications under the heading "Scope and Content of the Prior Art" (A 13a). It thus follows that the additional publications were used for the purpose of determining "the obviousness or non-obviousness of the subject matter."
>
> (2) A fair reading of the detailed description of the drawing in the *British Standards Institution's* publication, footnoted with a discussion of the *Notebooks of Leonardo da Vinci* (A 13a-14a) demonstrates that the majority was quite taken with the evidentiary relevance of this material.
>
> (3) The majority devoted considerable space to the discussion of these "papers that were not used at the hearing," *Boone, supra,* and any doubt as to their importance must be resolved in petitioner's favor. *Harrington* v. *California,* 395 U.S. 250, 251-252.

Petitioner respectfully suggests that in addition to its impact, the manner in which the new material was adduced runs counter to the requirements for impartial appellate review. Why did the judge travel to a distant library in the first place? Let it be assumed that he did so for the sole purpose of educating himself and reading up on the relevant technology. In the course of his research he found the prior art publications which he then photocopied and ultimately considered in the majority opinion. Whatever the motivation or reason for an appellate judge to engage in "several hours searching for and reading articles" (F 113a) in a patent case in which the trial court had declared the patent valid and a mountainous factual record, designed to educate the trial court, had been presented, it was certainly injudicious to exhibit the fruit of this research to the other judges on the panel during the subsequent conference on the case. By doing so, the appellate judge championed respondent's cause to Blohm & Voss' detriment on the basis of prior art material of which Blohm & Voss, and presumably the respondent, had no knowledge. Is it compatible with the rules of appellate review for an appellate judge to search outside the four corners of the record and to influence his colleagues with the results of the search? By considering these publications in the opinion and refusing to hear Blohm & Voss thereon, petitioner has surely been deprived of due process by the court below.

The Court is urged to exercise its power of supervision to declare that for an appellate court to embark on an independent fact-finding expedition after trial transgresses the established boundaries of appellate review and is repugnant to the concepts of due process and orderly legal procedure.

III.

The majority's *de novo* factual inquiry is violative of the directives of this Court.

The majority's retrial and disposition of the factual issues involved in this case are the antithesis of the true reviewing function of an appellate court. The dissenting judge characterized the majority's conduct by stating:

> "My basic quarrel with the majority is its undertaking to act like a trial court, rather than an appellate court; and in so doing, to do violence to the accepted rules of appellate view [sic]. This is not a case where the district court's factual finding of non-obviousness is clearly erroneous. It is a case where the majority has undertaken a *de novo* factual inquiry into the claim of obviousness." (A 33a)

The majority surely did not heed this Court's admonition in *Zenith Radio Corp.* v. *Hazeltine Research, Inc.*, 395 U.S. 100, 123. There the Court stated:

> "In applying the clearly erroneous standard to the findings of a district court sitting without a jury, appellate courts must constantly have in mind that their function is not to decide factual issues *de novo.* The authority of an appellate court, when reviewing the findings of a judge as well as those of a jury, is circumscribed by the deference it must give to decisions of the trier of the fact, who is usually in a superior position to appraise and weigh the evidence."

Here the majority did not only "decide factual issues *de novo*" but in so doing assumed the role of respondent's advocate by gathering, for respondent's benefit, new evidentiary material and by considering this material in the opinion.

IV.

The majority has not only disregarded the "clearly erroneous" requirement of Rule 52(a) F.R.C.P. but has in fact granted the respondent a summary judgment of invalidity.

The majority's treatment of this case is clearly at odds with the traditional appellate process. Here both parties have invested in a mammoth, extremely costly effort to present their case. A lengthy trial took place. Experts testified; models were built and demonstrated; films were shown; actual shipboard demonstrations were conducted. The trial judge, experienced and capable, rendered a detailed and reasoned opinion. But all was for naught because the majority of the court below concluded that it would have reached a different result. But an appellate court is not permitted to act like a trial court. "The determination of the factual contents of ambiguous testimony is for the trial court, and such determination can be set aside on review only if 'clearly erroneous'." *Guzman* v. *Pichirilo,* 369 U.S. 698, 702; *Graver Mfg. Co.* v. *Linde Co.,* 336 U.S. 271, 274-275.

Rule 52(a) F.R.C.P. embodies the doctrine that an appellate court is not entitled to reexamine the evidence *de novo,* let alone to search for new evidence, by prohibiting the setting aside of findings unless "clearly erroneous." The Rule recognizes that the trial judge is in a better position to weigh the evidence than is an appellate judge, *Zenith, supra.*

The "clearly erroneous" doctrine also holds true if the appellate court is not in agreement with the factual construction adopted by the trial court, *Zenith, supra.*

In *United States* v. *National Association of Real Estate Boards,* 339 U.S. 485, 495-496, this Court thus stated:

> "It is not enough that we might give the facts another construction, resolve the ambiguities differently, and find a more sinister case to actions which the District Court apparently deemed innocent. * * * We are not given those choices, because our mandate is not to set aside findings of fact 'unless clearly erroneous'."

See also *Commissioner* v. *Duberstein,* 363 U.S. 278, 289-291 and *United States* v. *Yellow Cab Company,* 338 U.S. 338, 340-341.

The majority's disposition of the case is in essence tantamount to a summary judgment. Petitioner has not been granted a trial on the factual issues raised for the first time by the majority. As a matter of fact here, unlike summary judgment procedure, the majority has not even had the benefit of counsel's argument concerning the prior art it considered, except for Lehmann '222, the sole prior art patent urged by respondent on appeal. Since the other prior art references of record were not relied upon by respondent, the briefs do not discuss them. Of course no arguments could be advanced in respect of the publications adduced by the majority. If the majority were permitted to have its way, a trial in the district court would be relegated to a wasteful exercise in futility and the litigants would be deprived of the benefit of orderly judicial procedure.

V.

In its *de novo* review, the majority misread the prior art patents.

It is one thing for an appellate court to substitute its judgment on complex technical issues for that of the district court, made in the light of extensive expert assistance.

However, it is quite another thing to misapprehend the technical facts and thereby substitute misjudgment.* This the majority has done.

The technical errors are discussed in particularity in Blohm & Voss' petition for rehearing (G 117a-129a). For the sake of brevity, this discussion is not repeated here but the Court is urged to consider the arguments in the petition for rehearing.

CONCLUSION

For these reasons, a writ of certiorari should issue to review the judgment of the United States Court of Appeals for the Fourth Circuit.

Respectfully submitted,

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Dated: June 19, 1974

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* The majority even misapprehended the issues which were decided by the district court. The majority stated that the district court found claims 1, 2 and 3 were not infringed, by implication, by respondent's 80-ton gear (A 21a). There was no such holding; the district court's opinion is completely silent on the subject.

Further, respondent's 30-ton gear is not, as stated by the majority (A 21a), a single pendulum-type gear, but a double-pendulum type.

Certificate of Service

Service of the foregoing "Petition for Writ of Certiorari" was made on respondent by mailing three copies thereof, first class postage prepaid on June 18, 1974, to each of Robert A. Shelton, Esq., Venable, Baetjer & Howard, 2 Hopkins Plaza, Baltimore, Maryland 21202; George J. Harding, 3rd, Esq., Smith, Harding, Earley and Follmer, 2100 Two Girard Plaza, Philadelphia, Pennsylvania 19102; and John G. Harkins, Jr., Esq., Pepper, Hamilton & Scheetz, 2001 The Fidelity Building, Philadelphia, Pennsylvania 19109.

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APPENDIX

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APPENDIX A

The Opinion of the United States Court of Appeals for the Fourth Circuit

UNITED STATES COURT OF APPEALS

FOURTH CIRCUIT

Argued May 8, 1973

Decided December 6, 1973

No. 73-1058

BLOHM & VOSS AG,
Plaintiff-Appellee,
v.
PRUDENTIAL-GRACE LINES, INC.
Defendant-Appellant.

Before:

BRYAN, *Senior Circuit Judge*, and WINTER and WIDENER, *Circuit Judges.*

WIDENER, *Circuit Judge*:

Appellant Prudential-Grace Lines, Inc.; presents the court with three issues:

I. Whether the district court, 346 F. Supp. 1116, erred in determining that plaintiff-appellee's patent is valid as against the defenses of (1) obviousness and (2) failure to recite a necessary structure.

II. Whether the district court erred in determining that defendant-appellant's ship cargo gear infringes appellee's patent.

III. Whether the district court erred in determining that plaintiff-appellee is not barred from recovery on the theory that the patent was misused.

This patent case involves the field of ship loading and unloading apparatus, commonly known and referred to as cargo gear. Plaintiff-appellee Blohm & Voss AG (hereinafter Blohm & Voss) is a West German shipbuilder. On February 15, 1966, Blohm & Voss acquired the assets, including patent rights, of H. C. Stulcken Sohn, the original assignee of the patent in suit. The patent in suit, United States Letters Patent No. 3,236,390, was issued to H. F. C. Sprengel, a German inventor. Sprengel '390 was granted February 22, 1966, based upon patent application No. 403,441 filed by Sprengel on October 2, 1964. Such patent application was a continuation-in-part of Sprengel's then co-pending United States patent application No. 361,422 filed April 24, 1964. No. 361,422 was abandoned when Sprengel '390 was filed.

Sprengel '390 discloses apparatus which is mounted on the deck of a ship to facilitate loading and unloading of cargo.[1] While the gear has many components, it is

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[1] Those more mechanically or nautically inclined may find Sprengel's description from the patent more enlightening than the court's hopefully simplified explanation.

> "This invention relates to a ship's loading apparatus. It relates particularly to a cargo boom for a ship. It relates more particularly to a cargo boom intended to be installed in through-swinging manner between uprights on a ship's deck to serve hatches both forward and aft of the boom mounting, and it relates still more particularly to a cargo boom of the kind described which has a pendulum purchase block fitting adopted to

basically assembled around three main structures, a boom

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swing or be swung past the boom in either direction depending upon whether the boom is serving a forward or an aft hatch.

* * * * *

"It is an object of the present invention to simplify the swinging through maneuver so that relatively untrained operating personnel can carry it out safely and without difficulty, and to reduce the time required for this maneuver to a minimum.

"It is another object of the present invention not only to permit a cargo boom to be moved in a continuous manner from a position over a forward hatch to one over an aft hatch and vice versa, but also to permit it to alternate for short periods of time between positions over the forward and aft hatches for the loading and unloading of cargo.

"For the accomplishment of the foregoing objects the present invention provides a cargo boom having at least one purchase block fitting at its upper end which is mounted to swing from side to side of the boom, that is, from forward to aft of the boom and vice versa, as a normal rather than an inverted pendulum, and which is provided with two turning heads each of which carries a guide sheave above the upper end of the boom proper. Specific embodiments of this invention include one in which the purchase block fitting is overhung on its pivot pin alongside the boom, another in which the boom is forked at its upper end with the purchase block fitting being pivotally mounted within the fork structure and thus adapted to swing through the boom, and another in which a pair of purchase block fittings are rotatively overhung along opposite sides of the boom.

"In the utilization of the present invention the hauling parts of a purchase tackle are led from a lower purchase block through passages in a novel fitting from which the purchase tackle and purchase blocks are suspended, to and over guide sheaves on this fitting, and from there either directly to guide sheaves in hollow rotating heads on top of the uprights between which the boom is mounted and between which it swings, or intermediately to another fitting, tackle, and block arrangement similar to the first. From the guide sheaves in the heads on top of the uprights, the hauling parts are led to guide sheaves and two kingposts. The kingposts are massive vertical structures affixed to the sides of the ship's deck, one port and one starboard directly across from one another. Located in between the kingposts is a long pole of lesser diameter called the boom. The boom is attached at its bottom end (foot) to a universal joint[2] on the ship's deck so that it may be pointed not only fore and aft but also outboard to port or starboard, and led up and down. Movement of the boom is controlled by cables which lead from winches to the upper part of the kingposts and thence to the upper part (head) of the boom. These are topping lifts. The top of the boom in each of the three embodiments disclosed by Sprengel '390 is constructed so that a cable or cables suspend therefrom. This cable and associated blocks to multiply power is the purchase (pur-

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within the uprights and thence out through slots in the walls of the uprights, going finally to the drums of two cargo winches.

"When the boom is swung back or forth between the adjacent uprights to serve an aft or a forward hatch, the hauling parts are carried over the top of the boom throughout its whole movement as the purchase block fitting is at all times oriented substantially vertically downwardly as a normal pendulum from its pivot point at or very close to the boom's upper end. Thus the hauling parts of the purchase tackle, led over the guide sheaves on the inventive pendulum purchase block fitting as aforesaid, do not interfere at all with the swinging through maneuver."

[2] While this may not be a true universal joint in that it is not designed to transmit rotary motion, a part of its function is the same. It allows rotation of the boom around its own longitudinal axis if in a position perpendicular to the deck and also movement of the boom around its bottom end in a plane perpendicular to the deck of the ship. The combination of the two movements will allow the boom to theoretically occupy any part of the space in the hemisphere, the center of the base of which is the universal joint.

chase gear). Affixed to the lower end of the purchase is a hook to which the cargo to be lifted is attached.[3]

Sprengel '390 is devised so that the single boom may tilt forward to accommodate loading and unloading of the forward hatches, and also tilt aft to accommodate the after hatches. At all times, including while the boom is in motion, it is affixed at its foot to the universal joint. Activating the winches which control the cables leading from the kingposts to the top of the boom controls the movement of the boom. To illustrate, assume the boom is dead center and perfectly upright. Activating the winch

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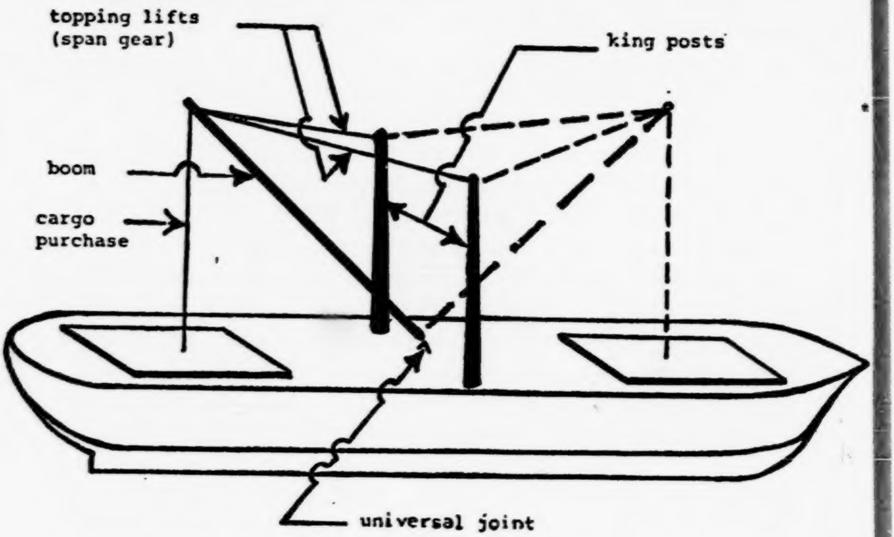
[3] The sketch below indicates those components common to cargo gear rigs discussed in this opinion. Solid lines show gear rigged to work after hatch. Dotted lines show gear swung through to work forward hatch.



on the starboard side to take in cable and the winch on the port side to pay out cable would cause the boom to lean toward the starboard kingpost. If both winches were activated at the same time to pay out cable, the boom would swing either forward or aft depending upon which way (forward or aft) it is shoved off dead center. Once it is off dead center, its own weight causes it to gravitate toward the deck and the cables prevent the boom from crashing down onto the deck like a felled three. By paying out the proper amount of cable, the boom may tilt forward or aft any desired number of degrees. To raise the boom, both winches take in cable.

Once the cargo is attached to the hook suspended from the purchase, and raised from the hold, the boom will be swung either to port or starboard to unload the cargo. Assuming the unloading is to port, the portside winch would take in cable and the starboard winch would pay out cable which would cause the boom to point to port, thus swinging the suspended cargo over the ship's side and above the unloading pier or barge.[4]

The cables previously referred to which suspend vertically from the top of the boom are rigged through blocks. A block is a more sophisticated and proficient version of what is commonly known as a pulley. Sprengel '390 discloses the use of blocks which are suspended from the top of the boom. One block, called the upper purchase block, is suspended from and attached to a fitting which fitting is affixed to one side of the top of the boom. The cables which suspend from this block lead down to the other block, which is called the lower purchase block. The cargo is attached to a hook which is affixed to the bottom of the lower block. The fitting from which the upper purchase block suspends is attached to a cross pin which runs at right angles to the longitudinal axis of the boom and through the boom near its top in a plane parallel to the deck.[5] It protrudes slightly out from the boom. The fitting rests on the protruding part of the pin alongside the boom so that the purchase blocks which suspend from the fitting likewise suspend down alongside the boom. Simply stated, configuration is not unlike the human body with the arms considered the purchase gear, the shoulder joint the fitting, and the body the boom.

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[4] Sideways movement of the boom is called slewing.

Sprengel '390 discloses three embodiments, two of which employ the above described gear. In one of the embodiments, the purchase gear suspends from only one side of the boom—like a man with one arm, if you will. In another embodiment, purchase gear suspends from both sides of the boom and accommodates heavier loads. In both embodiments, the purchase gear suspends like a pendulum from the fitting attached to the cross pin which extends through the top of the boom. In both embodiments, the fitting from which the purchase gear suspends pivots on the cross pin to allow the purchase gear to swing alongside the boom as the boom moves through its vertical plane fore and aft.

The alleged inventiveness of Sprengel '390 rests in the method by which it serves both forward and after hatches without rerigging.[6] Assume that the gear is set up to serve the forward hatch, in which case the boom would be tilted forward and the purchase gear suspended from the top of the boom down to the hatch. To service the after hatch, the boom would be raised until it is upright between the king-posts (dead center) and then lowered toward the after hatch. During this maneuver, the purchase gear (in the single gear and the double gear embodiment) which suspends from the side or sides of the top of the boom would simply swing alongside the boom and when the boom is tilted so that its uppermost part is over the after hatch, the purchase gear would be lowered down to the hatch. In the double gear embodiment, a fitting attached to both lower purchase blocks is uncoupled on one side to allow the purchases to pass on opposite sides of the boom.

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[5] References here and following to the various pins at or near boom or davit heads in a plane parallel to the deck refer to the normal operating position.

[6] It is readilly apparent that rerigging of at least some of the purchase gear would be required if some method did not exist to allow the purchase gear to swing alongside the boom in its transit from forward to after hatches, and vice versa.

As previously mentioned, cables which run from the top of the kingposts to the top of the boom control movement of the boom. Such gear is collectively called span gear, by Sprengel, but is nothing more nor less than topping lifts. The two span gear winches are located on the deck of the ship, one near each kingpost. The cables lead from the winches up through the kingposts and out the top and then over to the top of the boom. The span cable from each kingpost is attached to an end of the cross pin which extends through the head of the boom. There are pulleys attached to the ends of the cross pin called span blocks through which these cables run. The cables enter the top of the kingposts on circular runners called guide sheaves.[7] The taking in and letting out of these cables raises and lowers the boom as well as slewing it. The cables, which together with the upper and lower purchase blocks comprise the purchase gear, likewise have their origins at winches on the ship's deck, one near each kingpost. The hauling part of the purchase tackle is that part which is led from a purchase block to the winch for hauling it in and out to raise and lower the lower block. The cable is led by guide sheaves from the winch into and up through the top of the kingpost and then down through the pendulum fitting and around the upper and lower purchase blocks.

Sprengel disclosed his concept in a third embodiment which is for all practical purposes the same as the two previously discussed except for the configuration at the head of the boom. The boom in the third[8] embodiment resembles a giant needle with an oversized eye. The eye is formed however with straight lines so that it resembles a simple fork or "Y" which almost closes at the top instead of remaining totally open like a "Y". A pin (again perpendicular to the longitudinal axis of the boom and in a plane parallel to the deck) extends through the top of the fork connecting each side of the top of the "Y". A fitting rests on this pin, inside the fork of the "Y," just like the fitting which rests on the cross pin at the head of the boom in the two other embodiments. This fitting rotates freely around the pin. Suspended from this fitting is the purchase gear, an upper purchase block and a lower purchase block. To illustrate the working of the third embodiment of Sprengel '390, assume that the boom is tilted forward so that the top is over the forward hatch. The purchase gear would be suspended from the top of the boom down to the hatch. To service the after hatch, the boom would swing through the kingposts as in the other embodiments. The method of moving the purchase gear is, however, different. The upper and lower purchase blocks are drawn up closely together and the hauling part is taken in so that the entire suspended length of the purchase gear does not exceed the length of the opening of the "Y" at the top of the boom. The fitting on the cross pin rotates around the axis of the pin to allow the purchase gear to swing through the opening in the top of the boom as the boom swings through the kingposts. After the boom clears dead center, the purchase gear may be lowered; and once the top of the boom is over the hatch, it is lowered down to the hatch. If the crew attempted to swing the boom to serve the opposite hatch without drawing up the purchase gear, such gear would strike the boom as the boom swung through. By drawing up the purchase gear, such gear swings through the opening in the top of the boom.

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[7] A sheave is the rotating wheel of a block or pulley over which the line reeves.

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[8] In the patent itself this is called the second embodiment. Since the double pendulum is merely a duplicate of the single pendulum embodiment, it is more logical here to take them up first.

Blohm and Voss sued the appellant Prudential-Grace Lines (hereinafter Grace), claiming that the cargo gear on Grace ships infringed Sprengel '390. Grace denied infringement and claimed that the patent was invalid for failure to recite a necessary structure and invalid for obviousness. Grace also claimed that certain license agreements entered into by Blohm & Voss rendered the patent unenforceable on grounds of misuse. Because we conclude that Sprengel '390 is invalid because of obviousness, we do not reach the other issues.

[1-5] The conditions of patentability are set forth in the Patent Act in three sections, 35 U.S.C. §§ 101, 102 and 103.[9]

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[9] § 101 *Inventions patentable*

> "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title."

§ 102 *Conditions for patentability; novelty and loss of right to patent*

> "A person shall be entitled to a patent unless—
>
> "(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
>
> "(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or
>
> "(c) he has abandoned the invention, or
>
> "(d) the invention was first patented or caused to be patented by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application filed more than twelve months before the filing of the application in the United States, or

Sections 101 and 102 express the new and useful tests.[10] Section 103 expresses the non-obvious test with which we are most concerned here. In Graham v. John Deere Co., 383 U.S. 1, 17, 86 S.Ct. 684, 694, 15 L.Ed.2d 545 (1965), the Supreme Court carefully analyzed the content and history of the standards for patentability and enunciated the following standards for decisions in patent cases which must guide us here:

> "While the ultimate question of patent validity is one of law, A & P Tea Co. v. Supermarket Corp. [340 U.S. 147, 71 S.Ct. 127, 95 L.Ed. 162 (1950)], at 155, the § 103 condition, which is but one of three conditions, each of which must be satisfied, lends

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"(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for the patent, or

"(f) he did not himself invent the subject matter sought to be patented, or

"(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce tc practice, from a time prior to conception by the other."

§ 103 *Conditions for patentability; non-obvious subject matter*

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the difference between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject mater pertains. Patentability shall not be negatived by the manner in which the invention was made."

[10] See Graham v. John Deere Co., 383 U.S. 1 at 12, 86 S.Ct. 684, 15 L.Ed.2d 545 (1965).

> itself to several basic factual inquiries. Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy."

It is clear from *Graham* and United States v. Adams, 383 U.S. 39, 48, 86 S.Ct. 708, 15 L.Ed.2d 572 (1965), decided the same day as *Graham,* that not only must the invention meet the tests of novelty and utility, it must also be nonobvious in accordance with the standards there set forth. In *Graham,* the court admonished that the non-obvious criteria should be honored by "strict observance" (p. 18, 86 S.Ct. 684). Such strict observance was reiterated in Anderson's-Black Rock v. Pavement Co., 396 U.S. 57, 62, 90 S.Ct. 305, 24 L.Ed.2d 258 (1969). Not only must the criteria be strictly observed, we are told by the Supreme Court that "Courts should scrutinize combination patent claims with a care proportioned to the difficulty and improbability of finding invention in an assembly of old elements." A & P Tea Co. v. Supermarket Corp., 340 U.S. 147, 152, 71 S.Ct. 127, 130, 95 L.Ed. 162 (1950). Of like effect is this court's statement in Heyl & Patterson, Inc. v. McDowell Co., 317 F.2d 719, at 722 (4th Cir. 1963): "It is usually difficult to find true inventiveness in a combination patent."

With these basic considerations in mind, we turn to the patent in suit.

Scope and content of the Prior Art

Obviously, the field of ship's cargo loading and unloading gear is relevant to the inquiry, and it would seem only reasonable to consider the area of ships' gear generally and how the mechanical principles of force have been utilized in such gear. Cf. Mott Corp. v. Sunflower Industries, Inc., 314 F.2d 872 (10th Cir. 1963); A. J. Deer Co. v. U. S. Slicing Machine Co., 21 F.2d 812 (7th Cir. 1927).

The basic idea of booms, blocks, lines and winches is, of course, quite old. A perusal of manuals of seamanship and texts crusty with age indicate that principles of hoisting utilizing the mechanical advantage of lines and pulleys have been employed on ships at least as early as the 1700's. See Steel's Elements of Mast Making, Sailing and Rigging, from the 1794 edition, W & G Foyle, Ltd. London. A leading text, Knight's Seamanship, which was cited to the district court and this court, also reveals that use, utility, and the mechanical advantage of upright supports, blocks, and lines is quite old. A drawing in a British Standards Institution publication (BS 302: 1938, figure 23) depicts a typical ship's derrick rig. Such rig discloses a boom mounted on a universal joint which tilts along a vertical plane and may be slewed outward. Upper and lower purchase blocks suspended from the top of the boom are disclosed. Topping lifts from the mast to the boom are disclosed, as are hauling blocks to take up the purchase cable. Bearing in mind that gear to serve one hatch was well developed at least by 1930,[11] we turn to the more pertinent area of two-hatch gear and the concept of swinging the boom and purchase gear through to serve fore and aft hatches.

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[11] It is axiomatic that the use of booms and their associated gear as a means for handling the heavy weights (cargo, sails, ammunition, etc.) encountered on board oceangoing ships is very nearly as old as shipbuilding. The Notebooks of Leonardo da Vinci, for

1. William B. Ashe, No. 1,257,664 (1918).

Ashe '664 relates to an apparatus known as a boat davit, the purpose of which is to facilitate the employment of small boats carried on shipboard. When the boat is not in use, it is suspended by ropes between two vertical supports called davits. As a practical matter, boats are nearly always cradled on board ship when not in use. Among other advantages, this keeps the strain off the purchase blocks and tackle. The davits are located at or near the side of the ship and the boat suspends between them. They are secured at the base by a pivot joint allowing movement in a vertical plane perpendicular to the center line of the ship. Each davit has a pin which protrudes near its top. A fitting is attached to this pin, freely rotating around the pin, so that the fitting may swing back and forth like a man's arm if the vertical support be considered the body. A block is suspended from this fitting and the lines from this upper block lead down to a lower block. The ends of the lifeboat are attached to these lower blocks so that it is suspended from the davits. When the boat is not in use, the davits lean inboard so that the lifeboat is suspended over the deck. To lower the boat, the davits are pointed out over the water. As the davits swing outboard, the lifeboat swings in between them and out over the water. During this maneuver, the upper purchase block (and lower, of course) swings alongside the davit *like a pendulum.* Not only do the blocks

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example, p. 638 (Edited by MacCurdy, 1954), describe a method of calculating mechanical advantage for block and tackle rigs. Specific reference to publications is made only to indicate the availability of reference material showing that the age of the components of the patented device far antedates the patent in question, without attempt to accurately date the origin of many of the parts which may very well be lost in antiquity.

swing inboard and outboard, the upper pendulum block fitting which is attached to the side of the top of the davit also swings inboard and outboard. The district court discussed the Ashe patent but gave little or no weight to it because, among other things, it felt that davits, while they may loosely resemble booms, are primarily for lowering, and a boom must lower, raise and transfer. To the extent that such analysis was based on the assumption that davits do not raise, lower and transfer, it was clearly erroneous. Davits raise, lower, and transfer the boat both inboard and outboard. The district court took its definition of davit, which mentions only the lowering of life craft, from the Patent Office classification definitions. Never mentioned was the obvious fact that a ship's boats are taken on board each time they are launched at sea. Webster's New International Dictionary, 2nd Ed., defines davit as a form of crane, of metal or wood, fixed or movable, projecting over the side of a vessel or hatchway, for hoisting boats, anchors, accommodation ladders, cargo, etc. Knight's Modern Seamanship, 10th Ed., gives a definition of davit as a curved metal spar fitting in a socket on deck and projecting over the side or stern for hanging a boat or handling weights. Ch. VII of *Knight's* also illustrates various davits, some of which are not inset in sockets, as Ashe is not, and includes subheads on lowering and hoisting lifeboats at sea. Obviously, Ashe '664 is not precisely the same as Sprengel '390 but Ashe clearly discloses a load bearing support (the davit) which swings through a vertical plane employing a pendulum fitting (from which the purchase is suspended) which facilitates a ***pendulum-like movement*** of the hoisting gear ***alongside*** the support. The opinion of the district court gave insufficient credence to what it did teach and too much credence to the differences between Ashe '664 and Sprengel '390. Because Ashe did not anticipate Sprengel '390, the district court seemed to reason that the teachings of Ashe were virtually worthless because of their disclosure in the context of a davit rather than a cargo boom. Ashe was clearly relevant for the mechanical teachings it disclosed and should not have been so restrictively treated. Davis v. Matthews, 361 F.2d 899, at 901 (8th Cir. 1966); Ramirez v. Perez, 457 F.2d 267 (5th Cir. 1972); Beckman Instruments, Inc. v. Chemtronics, Inc., 439 F.2d 1369 (5th Cir. 1970).

2. Kohnenkamp, et al., No. 2,914,193 (1959).

Sprengel himself was the co-patentee of '193. It was the first workable solution to the problem to serving forward and after hatches with one boom and it was a commercial success. Kohnenkamp '193 is similar to Sprengel '390 with the exception of the boom head configuration and the gear at the head of the boom. The boom at its head resembles a "Y" or a simple fork; in fact, '193 has been referred to as the "old fork" and Sprengel's third embodiment in '390 as the "new fork." The single set of purchase blocks suspends between the arms of the fork. There is no pin or connecting piece between the arms except at the throat of the "Y" from which is suspended the upper purchase block from a fitting which functions much like the pendulum fitting in Sprengel '390. Each arm has a guide sheave at its end and the cable from each arm runs down to the purchase blocks so that each end of the purchase is a hauling part. When the boom is swung through, the purchase gear is drawn up closely to place the upper and lower purchase blocks together. The boom is then closely swung across the vertical, and to the opposite direction, and the lower purchase block is then lowered down the opposite side of the boom after the boom swings through. Despite the success of '193, there were shortcomings. Due to the height of the head of the boom at the point at which the purchase gear passed through the uprights, it was difficult to view and thus tricky to operate under even good conditions and more so at night or in bad weather. Highly skilled crewmen were required to complete the maneuver. Also, great care had to be exercised to insure that the lower purchase block was drawn up close enough to swing through the fork but not so tight as to foul the rigging of the blocks. It is not necessary to further describe in detail '193. It works exactly like '390 except for the different boom head configuration and the resulting swing through of the lower purchase block above the upper, rather than below it in a pendulum-like motion.

3. Lehmann No. 3,042,222 (1962).

[6, 7] Lehmann '222 recites in the patent the problems encountered in using one boom to serve both forward and after hatches and proposes to disclose gear which can accomplish the end without the problems. The boom, according to Lehmann '222, has two legs through which the hoisting gear may freely swing when the boom is swung through to serve the hatches forward and aft. A load bearing cross piece, perpendicular to the longitudinal axis of each boom leg in a plane parallel to the deck, is mounted between the legs of the boom at their top. On the cross piece is a fitting which rotates freely around the cross piece and from which fitting is suspended the purchase gear. The boom is mounted on a platform on the ship's deck which rotates. This is nothing more nor less than a universal joint. As the boom swings through the king-posts, the purchase gear suspended from the cross piece swings through the legs of the boom like a pendulum. A reading of the patent discloses that cables from the king-post are taken up or let out simultaneously to raise and lower the boom. The finding of the district court that Lehmann '222 taught a boom which rotates on a 180 degree axis to *face* one hatch and then *turn* to face the other hatch was clearly erroneous. Lehmann '222 instead discloses a boom which is raised and lowered, not rotated, to accommodate both hatches, precisely in the same manner as

Sprengel '390. It is also clear that Lehmann '222 discloses purchase gear which swings between the legs of the boom, alongside each leg, like a pendulum, again precisely like Sprengel '390.[12] Lehmann '222 is a paper patent; it has never been installed on any ship. The issuance of the patent, however, creates a presumption that it is workable. Simmons Co. v. A. Brandwein & Co., 250 F.2d 440, 447 (7th Cir. 1957); Application of Reynaud, 51 C.C.P.A. 1310, 331 F.2d 625, 628 (1964). And the alleged unworkability of a patent does not necesarily preclude its relevance in ascertaining the scope and content of the prior art. Hadfield v. Ryan Equip. Co., 456 F.2d 1218 (8th Cir. 1972); Sutter Products Co. v. Pettibone Mulliken Corp., 428 F.2d 639 (7th Cir. 1970).

4. Lehmann No. 3,107,790 (1963).

Lehmann '790 discloses a single boom structure attached at its foot to a universal type mounting between two kingposts. The kingposts may be the massive conical type or they may be constructed like tripods. The boom swings fore and after through the kingposts and may also slew outboard to port or starboard. In at least one embodiment, the hollow boom head of '790 is fitted with a cap which inserts into the boom head and rotates freely about the longitudinal axis of the boom. The topping lifts are attached to the cap. The hoisting gear is attached to and suspended from a fitting pivotally attached to pins protruding from the head of the boom below the freely rotatable cap. In Lehmann's own words:

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[12] See Column 1, lines 34-36; column 1, line 43; column 2, lines 61-70; column 3, line 49; and column 3, line 64 of Lehmann '222. Claim 1 reads as follows:

> "1. A cargo lift gear comprising two kingposts, a boom consisting of two legs, pivotal bearing means connected to the lower ends of the boom legs and mounting the boom for pivotal movement between said kingposts, and to either side of the plane defined by the kingposts, a loadbearing cross piece connecting the upper ends of the boom legs, a hoisting gear including upper and lower hoistive block means, the upper hoisting block means being supported by said cross piece substantially midway between the boom legs and the two boom legs defining an unobstructed clearance to permit the hoisting gear to pass between the legs, and topping life blocks attached to the upper ends of the boom legs at their outsides and to the kingposts for controlling the position of the boom."

> "[A] hoisting gear is preferably pivotally suspended from the boom head and a hoisting gear lead line runs over a guide block at the heel of the boom to a hoisting winch which is positioned laterally offset from the longitudinal center plane of the rig in the plane of the kingposts. *The hoisting gear is swung through a free space between the boom and the adjacent kingpost opposite the position of the hoisting winch or on the same side thereof. In this manner, all running gears remain unchanged in their relative position to the boom, kingposts and winches while the boom is shifted from hatch to hatch.*" [Emphasis added] Column 1, lines 43-47, Lehmann '790.

Lehmann '790 was installed on two ships. Lehmann '790 was cited to the district court but was only referred to in its opinion briefly ("rotating heads" 346 F.Supp. at 1126) and apparently was not heavily relied upon by defendant as rendering Sprengel '390 obvious. It is, however, a part of the record and is relevant on the concept of suspended purchase gear which swings through with the boom. It provides for a swing through of the purchase gear, like a pendulum, as does Sprengel '390. The swing through of the purchase without rerigging in '790 is accomplished by rotating the boom while in a nearly upright position, the boom being pivoted at both ends.

5. Sparrow No. 3,110,403.

Sparrow '403 was issued on November 12, 1963, and is commonly referred to as the Newport News gear. The gear was developed in 1962 during construction of five Challenger class cargo ships which Newport News Shipyard built for United States Lines. This gear works; it has been installed on cargo ships, and has enjoyed regular commercial use. Sparrow '403 discloses a single boom structure mounted on the deck on a universal type joint. The boom is mounted between two kingposts. The boom may swing forward and aft between the kingposts and slew outboard to port or starboard. In Sparrow, as in Lehmann '222 and '790, Kohnenkamp, and Sprengel '390, movement of the boom is controlled by blocks and cables extending from the kingposts to the head of the boom. Sprengel '390 calls it span gear; the others call it topping lifts—there is no difference except in semantics. Sparrow utilizes a rotary sleeve just below the boom head. The sleeve, simply stated, has a padeye protruding outward. The purchase gear suspends from the padeye. Sparrow's language is clear enough to merit quotation:

> "The cargo fall[12A] of the present invention includes an upper purchase block which is supported from a cargo fall support means mounted at the head portion of the boom. This cargo fall support means is rotatably mounted with respect to the boom and is axially fixed with respect thereto. *This permits the cargo fall support means to be swung from side to side of the boom* such that in moving from one hatch to another, the cargo support means can be swung through an angle of 180 degrees for disposing the upper purchase block in proper operative

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[12A] Fall, as used here and for the purpose of this opinion, is synonymous with purchase.

> position with respect to the boom over either of the two hatches with which the boom is employed." [Emphasis added] Column 1, lines 55-66, Sparrow '403.

Sparrow '403, while cited to the district court and discussed in the briefs to this court, was apparently not pressed below. Why it was not pressed is not clear, but we may not ignore its relevance as a part of the prior art. Sparrow discloses a successful means for serving forward and after hatches without the highly skilled operators needed and danger which attended the old fork. Sparrow also discloses purchase gear which swings alongside the boom as the boom swings through the vertical, like a pendulum. The sleeve at the boom head may be rotary, but the drawings and the claims clearly disclose purchase gear which swings alongside the boom as the boom swings through the kingposts.

The Differences Between the Prior Art and the Claims at Issue

[8] Blohm & Voss alleges that the gear on Grace's ships infringed claims 1, 2, 3, 14, 15 and 18 of Sprengel '390. The district court found that claims 1, 2 and 3 were not infringed but that claims 14, 15 and 18 were infringed.[13] Blohm & Voss did not cross appeal the no-infringement findings of claims 1, 2 and 3. Therefore, the validity of such claims is not at issue. The claims at issue are 14, 15 and 18 of Sprengel '390. The other claims, however, may be relevant because they disclose the various methods by which the inventor's concept

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[13] This holding resulted from the district court's conclusion that the Grace gear capable of 30 ton capacity did not infringe the claims (1, 2, and 3) of '390 which disclosed a single purchase fitting, but that Grace's 80 ton capacity gear did infringe the claims of Sprengel '390 (14, 15 and 18) which disclosed the double purchase gear.

may be employed. If the inventor says that one embodiment of his patent employs the same concept as another embodiment of his patent, then prior art similar to either embodiment would seem to bear on the issue of obviousness.[14]

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[14] The specific claims at issue are as follows:

(a) Claim 14

Claim 14 of Sprengel '390 reads as follows:

"The combination comprising (1) a cargo boom having an upper end and a lower end, (2) a head pin extending transversely from opposite sides of said cargo boom near the upper end thereof, and (3) a pair of purchase block fittings, each fitting adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, each fitting being pivotally mounted closely adjacent said cargo boom to swing from side to side of said cargo boom as a normal pendulum with said boom in substantially upright position, one fitting being so mounted on one extension of said head pin and the other fitting being so mounted on the opposite extension of said head pin, and each fitting including guide means extending above the upper end of said boom in upright position which is adapted to receive the hauling parts of the purchase tackle, and direct the same away from said boom.

(b) Claim 15

"The combination according to claim 14 in which said head pin extends sufficiently transversely from two opposite sides of said cargo boom to provide attachment points for span tackles at equal distances from the longitudinal axis of the boom, each of these attachment points being beyond the purchase block fitting mounted on the respective extension.

(c) Claim 18

"The combination comprising (1) a cargo boom having an upper end and a lower end, (2) a head pin extending transversely from the opposite sides of said cargo boom near the upper end thereof, (3) a pair of purchase block fittings, each fitting being pivotally mounted closely adjacent said cargo boom to swing from side to side of said cargo boom as a normal pendulum with said boom in substantially upright position, one fitting being so mounted on one extension of said head pin and

Appendix A

At the outset, we note that there are some differences between Sprengel '390 and each prior art reference, just as there are some differences between the prior art references themselves. Ashe's boat davit is necessarily different in some respects. Yet, in both Ashe and Sprengel '390 a load bearing support (call it a boom, a davit or whatever) is affixed to the ship's deck so that it may tilt back and forth (through dead center). In both, the head of the support is always directly over the matter to be raised, lowered or transferred, be it cargo or a lifeboat. In both, a fitting is pivotally mounted from a pin which protrudes from the support and is mounted at right angles to the longitudinal axis of the support in a plane parallel to the deck. In both, the purchase gear suspends from such fitting and swings alongside the support in pendulum fashion.

Kohnenkamp '193 very successfully accommodated forward and after hatches and disclosed all of '390 except for the boom head configuration and fittings used on '390's side mounted pendulum fittings, which constitutes the major difference between the two. The result of the side mounted pendulum fitting was that the danger and requisite skill problems of swinging through in Kohnenkamp '193 were solved.

There are differences between Lehmann '222 and Sprengel '390 side pendulum mounting. Sprengel '390 discloses a single boom structure, whereas, Lehmann '222

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the other fitting being mounted on the opposite extension of said head pin, and each fitting including guide means extending, above the upper end of said boom in upright position which is adapted to receive the hauling parts of the purchase tackle and direct the same away from said boom, (4) a pair of upper purchase blocks, each suspended from a purchase block fitting, and (5) a pair of lower purchase blocks, each suspended from an upper purchase block and each having a padeye depending therefrom."

discloses a boom with two legs, or, as plaintiff calls it, two booms joined at the top. Either way, Lehmann '222 discloses a boom or booms with an opening in between, through which the purchase gear swings as the boom swings fore and aft. One could say that it swings through the opening in the single boom, like the new fork of Sprengel '390, or one could say it swings alongside the separate booms in pendulum fashion like Sprengel's side pendulum embodiments. Plaintiff, in its zeal to show that Lehmann '222 does not anticipate Sprengel '390, fails to take account of what Lehmann '222 does disclose. Its position seems to be that Lehmann '222 must anticipate Sprengel '390 or it is irrelevant. Such is not the law. Graham v. John Deere, *supra*, sets forth the applicable standards, and specific anticipation by a single reference is not the rule.

Although it may be said that Lehmann '790 and Sparrow '403 are enough different from Sprengel '390 to the extent that the claims of neither could be said to anticipate Sprengel (at least defendant did not so argue), both disclose quite relevant concepts.

While the methods of obtaining the pendulum swing through of the purchase gear without rerigging in Lehmann '790 and in Sprengel '390 are different, in both, when the boom is swung from forward to aft, the purchase gear swings through alongside the boom like a pendulum. When the boom is positioned at a place other than at or nearly dead center, the fittings freely rotatable around the pins protruding from the top of the boom and which support the purchase gear, have precisely the same function as does the pendulum fitting in Sprengel '390.

Both Sparrow '403 and Sprengel '390 disclose purchase gear which swings alongside the boom like a pendulum as the boom swings through the kingposts. In Sprengel '390, of course, this is accomplished by the pendulum fitting attached to the pin. In Sparrow '403, the swing through withhout rerigging is accomplished by having a rotary sleeve near the head of the boom which freely rotates around the longitudinal axis of the boom and from which the purchase gear is suspended by means of a fitting which enables the purchase gear to always remain vertical.

The ultimate conclusion to be drawn from these comparisons will be considered along with the conclusion of obviousness.

The Level of Ordinary Skill in the Pertinent Art

[9] The lower court did not specifically resolve the level of ordinary skill in the pertinent art. Nor did the Supreme Court in *Graham, Adams* or *Anderson's-Black Rock, supra*.[15] Nor have many decisions decided since *Graham*. Yet, we are of opinion the foregoing discussion has, perhaps by comparison, made the level clear. The matter seems to be one which does not otherwise easily lend itself to specific articulation. The matter also seems to be necessarily related to the inquiry of the scope and content of the prior art. The inventor who ventures into the art is presumed to know the prior art references. Judge Rich stated it picturesquely when he wrote that the inventor should be imagined as seated in his workshop "with the prior art references—which he is presumed to know—hanging on the walls around him . . . ." Application of Winslow, 53 C.C.P.A. 1574, 365 F.2d 1017, 1020 (1966). Regardless of what the hypothetical man skilled in the art is presumed to know, the evidence before the

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[15] As this court noted in Technograph Printed Circuits, Ltd. v. Martin-Marietta Corp., 474 F.2d 798, 807, n. 16 (4th Cir. 1973), cert. den., —— U.S. ——, 94 S.Ct. 68, 38 L.Ed.2d 125 (1973):

> "Nowhere in *Anderson's-Black Rock* did the Supreme Court set out what was the level of ordinary skill in the pertinent art, but the court necessarily considered it because of the holding that the patent was obvious."

lower court revealed that the level of ordinary skill is high. Naval architecture is a recognized specialty in the field of design and engineering. The experts who gave evidence at the trial, by testimony or by deposition, were conversant with the elements of the various cargo gear structures. The patentees in the prior art who patented two-hatch cargo gear exhibited working familiarity with the type of components disclosed in the first workable gear, Kohnenkamp '193, and the capabilities and limitations thereof. It is clear that the field of naval architecture, including design of ship's cargo gear, is a specific area of engineering specialization in which a considerable degree of expertise is not uncommon.

Conclusions as to Obviousness

With the foregoing in mind, we turn to the ultimate question of obviousness. The patent is before the court with its statutory presumption of validity. 35 U.S.C. § 282. The strength of this presumption has been a matter of considerable comment by the courts. We note first that the patent was issued during a time when the Supreme Coprt "observed a notorious difference between the standards applied by the Patent Office and by the courts." *Graham, supra,* 383 U.S., at 18, 86 S.Ct. at 694. In light of the fact that the court, in *Graham,* stated that the general strictness of the test of patentability has remained invariable in the Supreme Court for 20 or 30 years, perhaps the suggestion may be that the Patent Office was too permissive in its concept of invention.

[10] Grace contends that the patent slipped through the Patent Office, while Blohm & Voss contends that the presumption is strengthened because the Patent Office considered Lehmann '222, Lehmann '790 and Kohnenkamp '193. We note that the file wrapper for Sprengel '390 shows that Ashe '664 and Sparrow '403 were not considered. This court has held, along with others, that

the statutory presumption of validity is weakened where pertinent prior art is not considered by the patent office. Blumcraft v. Citizens and Southern National Bank, 407 F.2d 557, at 561 (4th Cir. 1969); Johns-Manville Corp. v. Cement Asbestos Products Co., 428 F.2d 1381 (5th Cir. 1970; see Skirow v. Roberts Colonial House, Inc., 361 F.2d 388 (7th Cir. 1966); Sound Scribner v. United States, 360 F.2d 954, 960, 175 Ct.Cl. 644 (1966). We think the net effect of all these contentions and authorities is that the plaintiff came into court with a good patent and the burden was on the defendant to prove it bad. We are of opinion the defendant met the burden.

The Supreme Court has listed as secondary considerations which may be relevant on the issue of obviousness the following: (a) commercial success; (b) long felt needs; (c) failure of others, etc. Sprengel '390 was a commercial success, as was Kohnenkamp '193. Sparrow '403 was a commercial success, although perhaps to a lesser extent. Lehmann '790 was installed in ships. Prior to Kohnenkamp '193, there had been a long felt need in the industry for a gear utilizing one boom to serve both forward and after hatches without rerigging. Kohnenkamp '193 successfully met that need. While it is doubtful that the need to improve the old fork was as great as the need for the old fork itself, there was a need for gear which could serve forward and after hatches with greater safety and lesser skill. Sparrow '403 accomplished that result and so did Sprengel '390 to a more successful extent.

[11] These secondary considerations do not affect the analysis in this case to an extent requiring us to find nonobviousness. Commercial success without invention does not amount to patentability. *A & P Tea Co., supra.* Thus, we come to the ultimate legal question of validity, and it is clear that it is, in the final analysis, a question of law. Graham v. John Deere, supra; Heyl & Patterson, Inc. v. McDowell Co., 317 F.2d 719 (4th Cir. 1963); Lemelson v.

Topper Corp., 450 F.2d 845, 848 (2nd Cir. 1971); Cf. Stamicarbon, N.V. v. Escambia Chemical Corp., 430 F.2d 920, 924 (5th Cir. 1970).

[12, 13] While the specific claims of Sprengel '390 at issue are 14, 15 and 18 because they were the infringed claims, all the embodiments are relevant on the issue of obviousness. This is so in this case because the inventor has disclosed a single inventive concept in three embodiments. (Single purchase gear alongside the boom; double purchase gear, one on either side; and single gear suspended from a structure on the top of the boom like a closed wishbone.) The fact that the same concept is disclosed in the single and double purchase gear is expressed in the following colloquy between the district court and counsel for Blohm & Voss:

> "Now, the double pendulum block, as I believe I said at the pre-trial conference, while discussing what is invention and what is not, is nothing more than putting two of those up there.
>
> "The addition of the second block was simply conceived of by Mr. Sprengel because he wanted to increase the load that he was required to lift with the gear that was being ordered. He will testify that when required to lift the heavier load, he told his engineers to take the single pendulum block design and make a mirror image of it. That's all there is to it.
>
> "It has a single inventive concept, as I believe I tried to express to your Honor at the pre-trial conference. The concept is the utilization of a pendulum block mounted by one end of the boom for free rotation as the boom is swung through the vertical from fore to aft or aft to fore.
>
> "Whether you have one of them or whether you have two of them, the invention is the same." (Appendix (90a-91a).)

Thus, the inventiveness of Sprengel '390 does not lie in one set of purchase blocks or two sets. It would also seem that the inventiveness does not lie in having the purchase gear swinging alongside the boom because one of the embodiments has the purchase gear swing through the top of the boom. Nor does the inventiveness lie in the particular type of fitting used at the head of the boom from which the purchase is suspended. In plaintiff's own words: "Sprengel's invention does not reside in employing *only* pendulum-block fittings having the specific configuration, including hollow passages through which the cargo hoisting rope extends, depicted in the patent in suit. If this were not so, the patent in suit would surely have included at least some claims to such a specific fitting. But it does not." And later: "There is no evidence that Sprengel ever asserted a patent claim to such pendulum block fittings." (Appellee's brief, p. 35.) It is acknowledged that all of the elements are old in the art, and that there is nothing new in the concept of swinging through. Particularly in view of this, it becomes increasingly difficult to perceive what it is that Blohm & Voss claims as invention. On oral argument, counsel stated that the point of invention is the specific combination of elements. Of course, the fact that the elements are all old in the art does not necessarily mean the patent is obvious, nor is the use of hindsight permitted, *Graham,* 383 U.S., at p. 36, 86 S.Ct. 684, but as cautioned by the Supreme Court in *A & P Tea Co., supra,* such a claim must be closely scrutinized, bearing in mind the "difficulty and improbability of finding invention in an assembly of old elements." *A & P,* 340 U.S., at p. 152, 71 S.Ct., at p. 130. This would seem to be particularly true where, as here, the concept employed in the patent is also admitted to be old in the art.

Nevertheless, Sprengel was the first to combine elements in the precise fashion disclosed in '390, and we must determine whether such combination was obvious to a person of ordinary skill in the pertinent art. We think it was. The combination filled a commercial need and has enjoyed commercial success, but those matters without invention will not make patentability. *Anderson's-Black Rock, supra,* 396 U.S. at 61, 90 S.Ct. 305. The combination resulted in greater convenience and ease of operation but did not produce a "new or different function." *Anderson's-Black Rock,* at 60, 90 S.Ct. 305. Nor are there present here the elements considered in United States v. Adams, supra, and *Anderson's-Black Rock, supra,* of the inventor surmounting skepticism in the art to achieve unexpected results [16] or providing the key requirement or missing link to achieve a desired end. *Adams,* 383 U.S., at 51, 86 S.Ct. 708, and *Anderson's-Black Rock,* 396 U.S., at 60, 90 S.Ct. 305.

In addition, and by way of summary the kingposts, boom, universal joint, topping lifts, and purchase gear are common to Sprengel '390, Lehmann '222, Lehmann '790, Sparrow '403, and Kohnenkamp '193. Use of a fitting attached to the boom or davit, at or near its head, by a round pin or support whose longitudinal axis is perpendidicular to the longitudinal axis of the boom or davit in a plane parallel to the plane of the deck, which fitting rotates freely around such axis of the pin or support, and to which fitting is attached the upper purchase block, is common to Sprengel '390, Lehmann '222, Lehmann '790, and Ashe '664; and the fitting at the throat of the fork to which the upper purchase block is attached in Kohnenkamp '193 is remarkably similar, although without precisely the same function. Swinging the purchase gear, like a pendulum, alongside the boom or davit as it traverses dead center is common to Sprengel '390, Lehmann '222, Lehmann '790, Sparrow '403, and Ashe '664. Use of the freely rotating fitting attached to the pin or support at or near the head of the boom or davit to effect the pendulum swing through is common to Sprengel '390, Lehmann '222, and Ashe '664. In all events, invention is not claimed for the kingposts, boom, universal joint, topping lifts or purchase gear.

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[16] This, of course, is not the standard for patentability but its presence is persuasive as to non-obviousness. The fact that it is not conclusive is illustrated by the fact that in *Anderson's-Black Rock* experts testified that they did not believe that radiant heat could be used to solve the problem. The patentee successfully utilized radiant heat but the court nevertheless viewed the patent as obvious.

[14] Comparing the claims at issue (see esp. n. 14), *Graham,* 383 U.S., at p. 17, 86 S.Ct. 684, with the prior art, and mindful of the directions in *Graham,* we conclude that any achievement here was that of mechanical improvement utilizing known elements and known concepts and that such improvement was obvious to one reasonably skilled in the art. Improvement over the prior art does not necessarily rise to the dignity of invention.[17] Gordon Cartons, Inc. v. Alford Cartons, 218 F.2d 246, at 250 (4th Cir. 1954). We must never forget that it is a constitutional standard we apply and a strict one at that. *Anderson's-Black Rock,* 396 U.S., at 61, 62, 90 S.Ct. 305. Attempt here is not made to degrade Sprengel's achievements, but what he accomplished in '390 does not rise to the requisite level of inventiveness to entitle him the monopoly jealously guarded by the constitution. We think the following principle from *A & P Tea Co.,* which this court has noted with approval (*Gordon Cartons, supra,* 218 F.2d at 250), should apply here:

> "A patent for a combination which only unites old elements with no change in their respective func-

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[17] See also Inject-O-Meter Mfg. Co. v. North Plains Fertilizer Co., 439 F.2d 1138, 1142 (5th Cir. 1971):

> "In spite of these and other differences which may amount to improvement over valves of the prior art, in sum all that appellant did was to apply a known valve to an analogous use in a known combination or system. This is not invention. Such advance in the art, if advance there was, merely resulted from that type of activity reasonably to be expected of those mechanically skilled in the applicable art."

> tions, such as is presented here, obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men. This patentee has added nothing to the total stock of knowledge, but has merely brought together segments of prior art and claims them in congregation as a monopoly." A & P Tea Co., supra, 340 U.S. at 152-153, 71 S.Ct., at 130.

The judgment of the district court is Reversed.

WINTER, *Circuit Judge* (dissenting):

The majority concludes that the elements and concepts of the claimed Sprengel invention were all known prior thereto and that the "invention" was no more than an improvement obvious to one reasonably skilled in the art. Accordingly, Sprengel '390 is held invalid for obviousness. I respectfully dissent.

I.

At the outset, some preliminary comments are in order. First, I am constrained to comment on the breadth of the opinion's consideration of the prior art and to contrast it with the sole ground of obviousness urged on us in this appeal. The majority refers to Ashe '664, Kohnenkamp '193, Lehmann '222, Lehmann '790, and Sparrow '403. Mention of them, as well as technical texts including da Vinci's notebooks, are appropriate to demonstrate the background of the prior art. But, while Prudential-Grace, on appeal, predicates its claim of obviousness solely on Lehmann '222, the majority predicates its conclusion of obviousness on the prior art generally, with a startling lack of specificity of precisely what in the prior art made the Sprengel invention obvious. Indeed, the variety of the majority's references to prior art suggests to my mind non-obviousness. I fear that the majority has given short change to the proposition that the mere fact that various elements of the Sprengel patent may be found in the prior art is of little significance, because we deal here with a combination patent. It has long been settled that a combination patent may be valid when it represents a new combination of known elements having an effect greater than the sum of the several effects taken separately. Cantrell v. Wallick, 117 U.S. 689, 694, 6 S.Ct. 970, 29 L.Ed. 1017 (1886); United States v. Adams, 383 U.S. 39, 51-52, 86 S.Ct. 708, 15 L.Ed.2d 572 (1966); Anderson's-Black Rock v. Pavement Salvage Co., 396 U.S. 57, 60-61, 90 S.Ct. 305, 24 L.Ed.2d 258 (1969); Little Mule Corp. v. Lug All Company, 254 F.2d 268, 274 (5 Cir. 1958). See Brown v. Brock, 240 F.2d 723 (4 Cir. 1957). Of course, an appellate court may decide an appeal on the basis of anything in the record whether urged by counsel or not. But in the field of patent law, where our experience teaches us that the professional patent bar generally is in possession of more expertise than the average judge who is called upon to decide a patent case, I am loath to decide a case on the basis of contentions not advanced by counsel without, at least, inviting the comments of counsel on what may seem to us to be determinative considerations not advanced in presentation of the appeal. I will therefore direct my attention to the patent in suit and Lehmann '222.

My basic quarrel with the majority is its undertaking to act like a trial court, rather than an appellate court; and in so doing, to do violence to the accepted rules of appellate view. This is not a case where the district court's factual finding of non-obviousness is clearly erroneous. It is a case where the majority has undertaken a *de novo* factual inquiry into the claim of obviousness. As I shall demonstrate, the proper scope of our review is more constricted than that exercised by the majority.

Appendix A

II.

The Sprengel patent '390 basically describes a cargo boom and gear for the loading and unloading of cargo vessels. The patented boom is unique because it can, without rerigging, service hatches both fore and aft of it. It accomplishes this through two devices. First, the boom is attached to the ship's deck by a universal joint which permits it to swing to the starboard or port sides of the ship, and to swing in an arc from a position pointing toward the bow of the ship to one pointing toward the aft. This particular aspect of the boom is not original. The second and original device is a pendulum block, or blocks, attached to the top of the boom from which hang the boom's cargo tackle and cargo purchase (the ropes, hooks, etc., which are used to lift the load). Since the device at the top of the boom is a pendulum block, the gear hanging from it will always follow a straight drop plumb line perpendicular to the ship's deck regardless of the position of the boom. It is this effect—the perpetual perpendicular position of the cargo tackle hanging from the boom—which permits the boom to be swung fore and aft between the large kingposts without the necessity of rerigging the boom as was necessary on all prior operational booms. The benefit is that the same boom can load fore and aft hatches, alternatively or seriatim, without incurring delays for rerigging, the special delays and dangers of rerigging at night, or the hazards of rerigging in open water or while the ship is listing. Moreover, the boom is capable of lifting very heavy loads. After its development, the patented boom enjoyed great commercial success. This success has since waned somewhat due to the trend toward containerization.

This patent has the benefit of a statutory presumption of validity, 35 U.S.C. § 282; Prudential-Grace therefore bore a heavy burden of proof to demonstrate invalidity.

On appeal, Prudential-Grace's burden is even greater for the determination of patent validity, insofar as it concerns the obviousness and operability of the patent, is a factual issue, committed in the first instance to the district court and reversible only for clear error. Graham v. John Deere Co., 383 U.S. 1, 17, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966). The clearly erroneous rule, although virtually ignored by the majority, should be applied with special vigor in patent litigation because of the highly technical nature of the facts in issue. See Graver Tank Co. v. Linde Air Prod. Co., 339 U.S. 605, 610, 70 S.Ct. 854, 94 L.Ed. 1097 (1948).

While 35 U.S.C. § 103 states that a patent may not be obtained "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains," *John Deere,* 383 U.S. at 17-18, 86 S.Ct. at 694, prescribed the proper analysis under § 103:

> While the ultimate question of patent validity is one of law . . . , the § 103 condition . . . lends itself to several basic *factual inquiries.* Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level or ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of such subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy. (Emphasis added).

See United States v. Adams, 383 U.S. 39, 86 S.Ct. 708, 15 L.Ed.2d 572 (1966); Note, Subtests of "Nonobviousness;" a Non-technical Approach to Patent Validity, 112 U.Pa.L. Rev. 1169 (1964).

At the trial, all of the prior art recited by the majority was pressed on the district court to sustain the contention that the patent was obvious. The district court analyzed prior art and rejected Prudential-Grace's contentions with respect to each item. In this appeal, defendant's claim of obviousness focuses on Lehmann '222, called the "gallows boom." Not only was this claim rejected by the district court, but it had been considered and rejected by the patent office. See Reynolds v. Whitin Mac. Works, 167 F.2d 78, 83 (4 Cir.), *cert. denied,* 334 U.S. 844, 68 S.Ct. 1513, 92 L.Ed. 1768 (1948).

Prudential-Grace's boom was designed to accomplish the same result achieved by Sprengel '390, but Lehmann differed from Sprengel in several structural respects. While the Sprengel boom is a single cylindrical leg-like structure located between two vertical kingposts, the gallows boom is comprised of two cylindrical structures, or two legs, located between the two vertical kingposts and connected at the top by a rigid brace. In the Sprengel boom, the pendulum block and tackle gear is attached to one or both sides of the boom by a pin which runs through it and the boom. In the Lehmann boom, the analogous block gear is attached to the rigid brace between the two legs of the boom and hangs from it; hence, the "gallows" nickname. Another structural difference of import is the method by which the booms are attached to the deck. The Sprengel boom is attached by a pivotal joint which permits it to swing right and left and fore and aft. The Lehmann boom is connected to a rotary platform and the platform rotates to permit the boom to swing right or left in an 180 degree arc. The fore and aft swing of the Lehmann boom is not accomplished by rotation of the platform.

Appendix A

The district court found that the Lehmann device did not render the Sprengel boom obvious for the following reasons: (1) the method of mounting the boom on the deck differed; (2) it was a two-legged boom; and (3) it was impractical and was never used.

With regard to its first reason, I have no doubt that the district court was partially in error. It mistakenly understood that the fore and aft swing of the Lehmann boom was accomplished by rotation of the platform on which it was mounted. 346 F.Supp. at 1126, 1128. But the district court was correct that, because of its gallows structure, the Lehmann two-legged boom could not be mounted on the deck for universal movement as could Sprengel. Lehmann has a rigid connection between the two legs of the boom and thus it must be mounted on a turntable for movement between port and starboard.

That Lehmann was a two-legged boom is manifest. As a result, it is not susceptible of having pendulum block fittings mounted on either side of the boom, and hence it cannot teach or foreshadow that possibility. It is true that since the Lehmann boom swings fore and aft on a pin which runs through its legs, the cargo purchase which hangs from the top cross bar of its boom, like the purchase hanging from the Sprengel boom, always hangs straight down regardless of the position of the boom. But the Lehmann boom admittedly does not employ Sprengel's novel pendulum gear to achieve this effect. I therefore can find nothing in the Lehmann boom to suggest the structure of the Sprengel boom. To state my conclusion otherwise, I think that the most that can be said is the concept of a boom capable of being swung fore and aft was recognized and attempted in Lehmann, but the mechanical means sought to accomplish this purpose were different from Sprengel and moreover were unworkable.

Coupled with the structural and conceptual differences between Lehmann and Sprengel, which to my mind are sufficient alone to demonstrate that the district court's findings of non-obviousness was not clearly erroneous, the record establishes that Lehmann's boom was generally recognized as impractical. It was never manufactured, sold, or used. It could not, even in theory, lift the heavy loads of which the Sprengel boom is capable. Only one boom prior to Sprengel '390 achieved in actual practice the degree of fore and aft mobility, with ease and safety, that Sprengel '390 achieved. It was a prior Sprengel invention, the fork-type gear. It, however, operated on a different concept—a fact found by the district court and not challenged on appeal—and it was substantially slower and more dangerous than Sprengel '390.

Another indicia of non-obviousness was the skeptical reception which Sprengel '390 received. *Adams,* 383 U.S. at 52, 86 S.Ct. 708. At least one sophisticated purchaser required an undertaking that a proven forklift gear, which previously dominated the market, would be provided should the new Sprengel device "fail." Significant also is the fact that the Sprengel application was filed in the U.S. patent office in 1964 (a German application was made in 1963), and Lehmann '222, filed in 1959, had issued two years earlier. In the time which elapsed between Sprengel and Lehmann, no other person skilled in the art hit upon the Sprengel concept. Another more important indication was the financial and commercial success which the Sprengel boom received. It virtually superseded all prior booms on new shipbuilding. *Deere; Adams; Reynolds,* 167 F.2d at 83. Although commercial success alone does not resolve the issue of obviousness, it is nevertheless proper to consider it. Compton v. Metal Products, Inc., 453 F.2d 38 (4 Cir. 1971), cert. denied, 406 U.S. 968, 92 S.Ct. 2414, 32 L.Ed.2d 667 (1972). Finally, although obviousness is determined predominantly by examining what the claims in prior patents taught on paper, it is proper to consider whether the claims made in prior patents were ever operational and to discount the inoperable ones. *Adams,* 383 U.S. at 51-52, 86 S.Ct. 708; *Reynolds,* 167 F.2d at 84. Lehmann '222, the principal basis of defendant's claim of obviousness, has never been used on any ship.

The district court's specific conclusions that "no one . . . prior to Sprengel came up with a pendulum gear for a boom handling 120 tons or heavier loads, capable of servicing two hatches without rerigging" and that "unhesitatingly . . . even apart from commercial success, Sprengel's Patent '390 is valid under . . . Section 103" to me are unassailable under the clearly erroneous doctrine, or as legal conclusions. I think we should affirm that the invention covered by Sprengel patent '390 was not obvious.

III.

In an effort to defeat recovery, defendant has asserted that the Sprengel patent is invalid for failure to recite a necessary structure, that it was not infringed, and that in any event it was misused. The district court concluded otherwise on all issues. Since I disagree with the majority on the basis of its decision, I would be brought to a consideration of these issues, all of which are pressed on appeal. In view of the basis of the majority's decision, however, a full expression of my views on these issues would constitute nothing more than an academic exercise. I will therefore content myself merely by saying that I have considered them, and I find no merit in them, so that I cannot concur in the judgment of the majority even on different grounds.

APPENDIX B

The Opinion of the United States District Court for the District of Maryland

WATKINS, *District Judge.*

GENERAL STATEMENT [1]

1. The Parties and Jurisdictional Aspects

This is an action for patent infringement brought by plaintiff Blohm & Voss AG, a German company having its principal place of business and shipyard at Hamburg-Steinwerder, West Germany. Plaintiff designs and constructs ships and equipment for ships at its yard.

The defendant, Prudential-Grace Lines, Inc. (Grace)[2] is a corporation of Delaware having its principal place of business in New York, N. Y. It operates a shipping fleet, including six ships known as the Santa Lucia class which periodically load and discharge cargo at the Port of Baltimore.

Plaintiff asserts that the heavy lift cargo gear installed on such ships infringes its patent in suit.

Sun Shipbuilding & Dry Dock Company of Chester, Pennsylvania (Sun), constructed the Santa Lucia class of ships and the heavy lift cargo gear installed on them. Sun is obligated to defend, indemnify, and hold Grace harmless on account of any charge of infringement by such cargo gear, including the expenses of litigation, and is paying for the services of defendant's counsel.

The action for infringement is based upon 35 U.S.C. sections 271 and 281. The jurisdiction of this Court is grounded on 28 U.S.C. section 1338(a). Venue is grounded on 28 U.S.C. section 1400(b). Jurisdiction in respect of defendant's counterclaim for a declaration of invalidity of the patent in suit is grounded on 28 U.S.C. sections 2201 and 2202 as well as 28 U.S.C. section 1338(a).

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[1] The paragraphs through "Damages and Relief Sought" closely follow the Joint Pre-Trial Memorandum of the parties.

[2] The original defendant was Grace Line, Inc. By merger it has become Prudential-Grace Lines, Inc.

2. The Patent in Suit

The patent in suit is U. S. Letters Patent No. 3,236,390 ('390) granted February 22, 1966, based upon patent application Serial No. 403,441 filed October 2, 1964 by H. F. J. Sprengel (Sprengel). Such patent application was a continuation-in-part of Sprengel's then co-pending U.S. patent application Serial No. 361,422 filed April 21, 1964, now abandoned.

The patent relates to ship's loading apparatus broadly referred to as cargo gear. The patent discloses gear comprising a long boom, pivotally mounted on the deck on the centerline of the ship, having boom head fitting(s) carried by the upper (or outer) end of the boom. The upper cargo[3] blocks are carried by such fittings.

The gear may be constructed in two variations—one using a single upper cargo block mounted on the fitting to swing in pendulum movement along one side of the boom, and a double pendulum variation having two upper cargo blocks located on opposite sides of the boom, pendulumly mounted on the fittings.

The patent is entitled to the April 17, 1964 filing date of German patent application St 21,981 in respect of the double pendulum type of the heavy lift cargo gear. The patent is entitled to the October 12, 1963 filing date of German application St 21,185 in respect of the single pendulum type of gear.

The above mentioned United States patent applications were assigned, and the patent was originally granted, to

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[3] Variously described as "cargo", "purchase" or "lifting" blocks.

H. C. Stulcken[4] Sohn, also a company of Germany. In early 1966, plaintiff acquired the business and assets of Stulcken, including the then-pending application S.N. 403,441, upon which the patent in suit was about to be granted. Plaintiff's ownership of the patent has been recorded in the Patent Office. There is no controversy regarding ownership of the patent.

3. The Contentions of the Parties

A. By Plaintiff, Regarding Infringement

Plaintiff contends that claims 1-3, 14, 15 and 18 of the patent are infringed by the heavy lift cargo gear installed and used on the Santa Lucia class of ships.

To the extent that defendant contends that there is no literal infringement of such claims by its cargo gear, plaintiff contends that the structure of such gear achieves the same result in the same way by the same means as the patented invention, and that any structural differences are obvious mechanical equivalents.

Plaintiff contends that the invention has been a commercial success based upon its technological merits. The gear is capable of handling exceptionally heavy loads, up to 250-300 tons. Two hatches (fore and aft) can be served by the gear alternately without dis-mantling or rerigging the gear. By virtue of mounting the upper cargo block(s) to swing in pendulum fashion on one side of the upper end of the boom, in the case of the single pendulum, or on opposite sides in the case of the double pendulum, the movement of the boom from one hatch to another is simplified, thereby saving time and permitting the use of less skilled workmen. In the double pendulum construction, as is here in suit, two upper cargo blocks are mounted on fittings on opposite sides of the boom head. This additionally and optionally permits using only one upper cargo block to handle light loads (not exceeding 50% of normal capacity) at twice the normal lifting speed, although this is not disclosed in the specification nor claimed in the patent in suit.

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[4] In German the "u" has an umlaut, often reproduced in English as "ue". For simplicity, the single letter "u" is used herein, except in direct quotations.

Plaintiff contends that Sun is a real party in interest.

B. By Defendant, Regarding Invalidity

Defendant contends that the claims of patent '390 in suit are invalid on the following grounds:

1. The differences between the claimed subject matter and the prior art are such that the claimed subject matter as a whole would have been obvious at the time the alleged inventions were made to a person having ordinary skill in the art to which said subject matter pertains (35 U.S.C. section 103).

2. The claims in suit are invalid because the specification of the patent in suit does not contain a written description of the alleged invention, and of the manner of making and using it in the full, clear, concise and exact terms required by 35 U.S.C. section 112.

3. The claims in suit are invalid because they fail to particularly point out and distinctly claim the subject matter of the alleged invention (35 U.S.C. section 112); the claims call for structures incapable of performing their purported functions and call for inoperative structures.

C. By Defendant, Regarding Non-infringement

Defendant contends that none of the patent claims in suit is infringed because each of said claims contains claimed structure which is not found in any of defendant's devices which are alleged to infringe.

D. By Defendant, Regarding The Estoppel Defense

Defendant contends that plaintiff knew that the claims in suit were too limited to cover the rigging configuration of defendant's allegedly infringing devices long prior to the allowance of the patent in suit, but failed to seek claims broad enough to read on said rigging configuration and only sought limited claims to implement its efforts to obtain the patent in suit and, therefore, is not entitled to any equitable assistance in construing the claims in suit to read on the allegedly infringing devices and is estopped from asserting said claims against said devices.

E. By Defendant, Regarding Patent Misuse

Defendant contends that plaintiff has misused its United States patent in suit by means of the license agreement with its exclusive United States licensee, MacGregor-Comarain Co., Inc. ("MacGregor"), both viewed alone, and as a part of a worldwide scheme by plaintiff to divide and allocate markets and suppress competition through similar licensing arrangements, all in violation of the anti-trust laws of the United States, in that plaintiff has:

1. Used the patent in suit to require MacGregor to pay royalties on various Stulcken Masts which are unpatentable in this country.

2. Used the patent in suit to tie in procurement of services and goods from plaintiff outside the scope of the patent monopoly.

3. Used the patent in suit to impose improper restrictions on the activity of MacGregor outside the scope of patent monopoly.

4. Used the patent in suit to improperly control unpatented products.

5. Imposed territorial and customer restrictions on MacGregor pursuant to a scheme, furthered by the MacGregor license and its other licenses worldwide, to divide and allocate markets for all two-hatch cargo boom equipment, patented and unpatented, and to monopolize the world market for such gear.

6. Bound MacGregor not to question the validity of plaintiff's patents.

4. Damages and Relief Sought.

Plaintiff sought an adjudication that the patent is infringed, and an injunction permanently enjoining defendant from further infringement, by either the use of the heavy lift cargo booms installed on the Santa Lucia class of ships and/or future installations, and damages for past infringement. The amount of damages is not liquidated. Plaintiff has, however, agreed that the dismantling of Grace's ships would impose an inequitable hardship, and if it is successful in this case will be content with money damages for past infringement, and an injunction only against new infringing installations.

Defendant seeks an adjudication that the patent in suit is not infringed and is invalid and void. Defendant further seeks a decree that the patent is unenforceable because of plaintiff's alleged acts of misuse and violations of the Federal antitrust laws and that plaintiff is estopped from asserting the patent against the defendant.

Both parties seek an assessment of costs and an award of reasonable attorneys fees.

VALIDITY

Statutory Provisions

United States Code, Article 35, Section 282. "Presumption of Validity"

Appendix B

> "A patent shall be presumed to be valid. The burden of establishing invalidity of a patent shall rest on a party asserting it."

[1] The burden is a heavy one. Copease Mfg. Co. v. American Photocopy Equipment Co., 298 F.2d 772, 777 (7 Cir. 1961); Diamond International Corporation v. Walterhoefer, 289 F.Supp. 550, 554 (D.Md. 1968); Grinnell Corp. v. American Monorail Co., 285 F.Supp. 219 (D.S.C. 1967). This presumption is strengthened where two of the three patents relied upon by defendant were made of record by the Examiner, and where the remaining art relied upon by defendant was long known and is less pertinent. Chesapeake & Ohio Railway Co. v. Kaltenbach, 95 F.2d 801, 804 (4 Cir. 1938); Bowser, Inc. v. Richmond Engineering Co., 166 F.Supp. 68, 75 (E.D.Va. 1958), modified on other grounds, 264 F2d 595 (4 Cir. 1959).

Defendant's contention that the patent "slipped through" the Patent Office "like a greased pig", is picturesque but indecisive. Whether a tortuous process before the Examiner, who at last yields without explaining why, strengthens or weakens the presumption, has been questioned. Cook Engineering & Electronics, Inc. v. Hickory Foundry and Machine Co., 231 F.Supp. 271, 273 (W.D.N.C. 1964); Aghnides v. F. W. Woolworth Company, 335 F.Supp. 370, 377 (D.Md. 1971).

The "easy course" certainly eliminates any problem of file wrapper estoppel in connection with infringement

Section 103: "Conditions for patentability; non-obvious subject matter" reads as follows:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

> invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Section 112: "Specification" reads as follows:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.
>
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention. A claim may be written in independent or dependent form, and if in dependent form, it shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim. An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The Factual Determination [illegible] Obviousness

The criteria for the determination of obviousness under Section 103 have recently been reviewed by the Supreme Court in Graham v. John Deere Co., 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545 (1965) where the Court said (pages 17-18, 86 S.Ct. page 694):

> While the ultimate question of patent validity is one of law . . . the § 103 condition, which is but one

of three conditions, each of which must be satisfied, lends itself to several basic factual inquiries. Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy. See Note, Sub-tests of "Nonobviousness": A Non-technical Approach to Patent Validity, 112 U.Pa.L.Rev. 1169 (1964).

HISTORY OF TWO HATCH GEAR

From at least the end of World War II, many efforts were devoted to the development of gear that would permit one boom to serve two hatches, fore and aft, without rerigging.[5] Sprengel has certainly been in the forefront of this work.

About 1953, Sprengel developed so-called rotary-type gears, in one of which the boom was rotated by hand, and in another of which the head of the boom was mounted for rotation, and the lifting apparatus was hung from the boom head. At about the same time, he designed the so-called Falkenstein gear, which successfully served a fore and an aft hatch, but which required some rerigging.

After reading an article on the Falkenstein, the owner of the Hansa line contacted Stulcken about the construction of gear of the capacity of at least 120 tons[6] to service two hatches without re-rigging. In return for such an undertaking, Hansa placed with Stulcken an order for an entire ship, contrary to its previously unbroken practice of having its ships built at another yard.

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[5] The recent development of containerized vessels, with little or no ship's gear, has slowed down, if not halted, the production of the gear about to be discussed.

[6] The largest rotary type built at the time of trial was 70 tons (PX 81).

Sprengel worked on this project, first projecting a rotary-type gear, but he did not consider that it could handle loads as heavy as 120 tons. He[7] then conceived the design of the fork-type gear installed on Hansa's M/S Lichtenfels (PX 28; 9C; United States Patent No. 2,914,193, issued November 24, 1959).

This gear had the top of the boom formed in a "Y" or "fork" configuration, and the upper and lower cargo blocks were suspended from the crotch of the fork. When it was desired to swing the boom through the vertical plane to service a different hatch, the cargo blocks were brought together, a wedge on the top of the lower block fitting into a wedge-shaped claw in the bottom of the upper block, and the "composite block" swung as an "inverted pendulum" through the fork over the top of the boom.

The fork gear was an immediate commercial success, about 120 having been built prior to 1965 (PX 52, 52A); and defendant concedes that this design was a substantial contribution to the art (Tr. 184). In fact, defendant is rather fulsome in its praise of the fork-type gear—so that it may argue that the patent in suit is inferior to it; or at least no better.

There were and are, however, some deficiencies in the fork design. Care had to be taken that the upper and lower blocks were brought snugly together but that this was not overdone; the height and size of the blocks made visibility poor at night; and it was extremely difficult to swing the gear to an opposite hatch under list, or under open sea conditions.

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[7] The confusion in the listing in the Patent of two others with Sprengel as inventor will later be discussed.

Appendix B

Lehmann United States Patent No. 3,042,222 issued in July 1962, on an apparatus referred to during the trial as a "gallows" rig. It is heavily relied upon by defendant and will later be considered in detail.

Lehmann United States Patent No. 3,107,790 issued in October 1963, for gear having a rotatable boom head. Although cited in the statutory notice, it is not now relied upon in the argument on obviousness. Sparrow (Newport News) United States Patent No. 3,110,403, issued November 12, 1963, also involves the use of a rotary sleeve, and likewise is not being pressed by defendant.

Some eight years later, while on a trip, Sprengel turned his mind to a consideration of possible designs that would be better than the fork-type gear in speed and ease of operation and safety. The concept of the pendulum block of the patent in suit occurred over a period of five to ten minutes (Tr. 1011) and he completed substantially final drawings of the concept of the single pendulum in two days.[8] The general concept, now apparently simple, was to hang the cargo blocks, pendulum fashion, from the upper end of the boom so that in every position of the boom the cargo blocks would be vertical, whether the boom was swung fore and aft, or laterally.

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[8] Defendant urges that these relatively short periods of time indicate obviousness. The Court would be more inclined to attribute the result to one of those rare "flashes of genius", by a man who had already made substantial contributions through rotary and fork-type gear. In any event, "Patentability shall not be negatived by the manner in which the invention is made." (Title 35, § 103).

Sprengel's explanation is refreshingly simple. When asked if there was any particular event or occurrence which caused him to get started on the patent in suit, he replied:

> "A. No, I think not.
>
> "I can never explain—often they ask me, 'How did you come out with the fork type', and now the same way, 'How did you come to this idea?'
>
> "You cannot explain it. You have it, or you don't have it.
>
> "I did know what I could do, and at some moment, I would do it. And before that, there was no solution. That was with the fork type before, and now the same with the pendulum type." (Tr. 1010-1011).

The initial concept was that of hanging the cargo blocks from only one side of the boom. Such a single pendulum-block gear was successfully installed on the Westphalia.[9] Shortly thereafter, in an endeavor to increase the lifting capacity of the boom, he hung cargo blocks on opposite sides of the boom—the double pendulum. Despite the commercial success of the Fork-Type construction, it was immediately superseded by the Pendulum-Block design.

In the specification of '390, the general nature of the invention is stated:

> "This invention relates to a ship's loading apparatus. It relates particularly to a cargo boom for a ship. It relates more particularly to a cargo boom intended to be installed in through-swinging manner between uprights on a ship's deck to serve hatches both forward and aft of the boom mounting, and it relates still more particularly to a cargo boom of the kind described which has a pendulum purchase block fitting adapted to swing or be swung past the boom in either direction depending upon whether the boom is serving a forward or an aft hatch."[10]

There follows a reference to the fork-type gear and to its "operational shortcomings."

The specification then continues:

> "For the accomplishment of the foregoing objects the present invention provides a cargo boom having at least one purchase block fitting at its upper end which is mounted to swing from side to side of the boom, that is, from forward to aft of the boom and vice versa, as a normal rather than an inverted pen-

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[9] Tr. 564-73. PX 42 is the motion picture of the successful testing of this gear.

[10] Col. 1, lines 16-26.

dulum, and which is provided with two turning heads each of which carries a guide sheave above the upper end of the boom proper. Specific embodiments of this invention include one in which the purchase block fitting is overhung on its pivot pin alongside the boom, another in which the boom is forked at its upper end with the purchase block fitting being pivotally mounted within the fork structure and thus adapted to swing through the boom, and another in which a pair of purchase block fittings are rotatively overhung along opposite sides of the boom.

"In the utilization of the present invention the hauling parts of a purchase tackle are led from a lower purchase block through passages in a novel fitting from which the purchase tackle and purchase block are suspended, to and over guide sheaves on this fitting, and from there either directly to guide sheaves in hollow rotating heads on top of the uprights between the boom is mounted and between which it swings, or intermediately to another fitting, tackle, and block arrangement similar to the first. From the guide sheaves in the heads on top of the uprights, the hauling parts are led to guide sheaves within the uprights and thence out through slots in the walls of the uprights, going finally to the drums of two cargo winches.

"When the boom is swung back or forth between the adjacent uprights to serve an aft or a forward hatch, the hauling parts are carried over the top of the boom throughout its whole movement as the purchase block fitting is at all times oriented substantially vertically downwardly as a normal pendulum from its pivot point at or very close to the boom's upper end. Thus the hauling parts of the purchase tackle, led over the guide sheaves on the inventive

> pendulum purchase block fitting as aforesaid, do not interfere at all with the swinging through maneuver."[11]

Figures 1-12 set forth various embodiments of the invention.

Claims 1-3, and 14, 15 and 18 are in suit. Claims 1 and 14, set out below, will, in general, suffice.

> "What is claimed is:
>
> 1) "The combination comprising (1) a ship's deck, (2) a cargo boom disposed above said deck, said cargo boom having an upper end and a lower end, (3) pivot mounting means for said cargo boom disposed between the lower end thereof and said deck, said mounting means permitting rotation of said cargo boom in a vertical plane to swing through between uprights, and (4) a purchase block fitting adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, said fitting being pivotally mounted on said boom near the upper end thereof in a manner permitting it to swing from side to side thereof as a normal pendulum in the direction of motion of said boom between uprights, and said fitting including guide means extending above the upper end of the boom which is adapted to receive the hauling parts of the purchase tackle and direct each of the same toward an upright.
>
> 14) "The combination comprising (1) a cargo boom having an upper end and a lower end, (2) a head pin extending transversely from opposite sides of said cargo boom near the upper end thereof, and (3) a pair of purchase block fittings, each fitting

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[11] Col. 1, line 69—col. 2, line 37.

> adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, each fitting being pivotally mounted closely adjacent said cargo boom to swing from side to side of said cargo boom as a normal pendulum with said boom in substantially upright position, one fitting being so mounted on one extension of said head pin and the other fitting being so mounted on the opposite extension of said head pin, and each fitting including guide means extending above the upper end of said boom in upright position which is adapted to receive the hauling parts of the purchase tackle, and direct the same away from said boom."

Defendant challenges validity on grounds of obviousness and failure to claim an operative structure.

OBVIOUSNESS

In its claim of obviousness, defendant relies upon shear legs, a boat davit, Sprengel's fork-type gear, and Lehmann's gallows-type design as prior art. The patents on the fork-type gear and gallows-type gear were cited of record in the prosecution of the patent in suit. The Lehmann gallows-type gear has never been installed in any vessel.

a. Old fork-type

Defendant expends a substantial portion of the section of its brief relating to obviousness to an argument that the fork-like structures embodied in Figures 10 and 11 of '390 are inferior to the older fork-type structure embodied in patent 2,914,193. Sprengel candidly admitted that it was the patent attorney who suggested that "we take in every variation" (Tr. 1410) and that the new fork rig while not impractical was approaching it (Tr. 2696-7). However, in the '390 specifications it was asserted that the new fork rig was better than the single pendulum rig "for handling loads in the very high weight ranges",[12] but not as suitable when there would be frequent alternations between fore and aft hatches.[13] One other advantage of the "new fork" is that it is not necessary to remove the Flemish (cargo) hook for a swing through maneuver of the cargo boom, and that the cargo purchase can be employed to swing the boom through against an unfavorable trim.

In any event, this "new fork" gear has never been built or installed, and no claim for infringement has been made.

Defendant also strenuously argues that the double pendulum rig is not superior to the old fork rig.

Defendant cites no authority to support the proposition that a new, different and satisfactory way to accomplish a result is not inventive, because a different way had previously existed. Under this approach, if waste had previously been removed from gutters by manual sweeping into shovels, no invention would exist in mechanical removal, by sweepers and/or blowers or vacuum. The old fork gear did a commercially satisfactory job in view of devices then available. It was, however, superseded by the pendulum gear. Were it now, however, necessary, to establish the superiority of the pendulum gear over the old fork, the Court is of the opinion that this has clearly been done.

Defendant's main reliance, over public response, as to the equivalence or superiority of the old fork over the pendulum gear, is upon literature of plaintiff extolling the virtues of all of its gear; rotary, fork or pendulum.

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[12] Col. 7, lines 34-35.

[13] Col. 7, lines 47-50.

Surely defendant would have been unwilling to accept as proof of superiority of the pendulum gear the self-adulatory praise of plaintiff. The pragmatic supersedure of the pendulum over all other gears is the most persuasive proof possible, since it is related to business advantages, not advocacy. The advantages of a simple swing through as contrasted with lifting and coupling the upper and lower blocks and eliminating the Flemish hook, is obvious. Defendant contends that the "modification" of the inverted pendulum in the old fork-type gear to a normal pendulum in '390 is obvious. However, in its brief on infringement (p. 28), defendant argues that a reversal of rotational elements is not an equivalent, citing Blaw-Knox v. Hartsville Oil Mill, 394 F.2d 877, 883, 884 (4 Cir. 1968).

b. "Shear legs"—Knight's Modern Seamanship

Defendant relies upon plate 44 of Knight's Modern Seamanship (PX 14, PX 16). This old rigging system includes a pair of shear legs supporting a cargo purchase having a pair of upper and lower cargo blocks and an equalizing block between the upper cargo blocks. Fore and aft movement was not contemplated because there are no calculations to show the related stresses. *There is no pendulum block fitting because there is no boom.*

Bebler, an expert, whose deposition was taken by plaintiff, but who was not employed by plaintiff or its counsel [14] testified to some similarity in approach the shear legs being the "simplest of elements—a pulley—known from the earliest time of man, to a rather sophisticated bearing-mounted assembly . . .[15] He further testified: [16]

> "A. Most of us live on past experience, and while just for example this PX 14 may be used on shear

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[14] PX 123, p. 82.

[15] PX 123, pp. 114-115.

[16] PX 123, pp. 116-117.

> legs, I personally had never seen it. To the best of by knowledge we had never used a split load center line system with two winches hauling on it in any of our previous conventional heavy-lift rigging. I have no doubt somebody else thought of it but never developed the hardware to make it a completely useful thing. Once it is accomplished you can say, 'Oh, yes, the Egyptians used this same sort of rig with pulley and block and fall back in the mid-centuries,' so when you are saying it is something obvious, yes, it could have been, but apparently it was not, because it was not generally or well-accepted prior to that time, nor does it fall within my own experience to say that I have seen it tried with good, bad or indifferent results.
>
> "Q. You had seen it tried? A. No. * * *
>
> *"It is a case of hindsight instead of foresight."*

Defendant's expert, Stiglich, admitted that the shear legs device was not directed to cargo handling as such;[17] that the drawing was in error;[18] that he had never seen shear legs used for as much as 80 tons, and that additional blocks would be needed;[19] that the structure was not intended for repeated operation; and that he would not specify its use on ships.[20]

c. Boat davit—Ashe Patent 1,257,664 (PX 2).

Davits may loosely be considered as "devices in the nature of booms or cranes from which a life craft is lowered by means of cables, or other added lowering means, to the water".[21]

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[17] Tr. 2020

[18] Tr. 2022.

[19] Tr. 2057.

[20] Tr. 2059.

[21] DX 67, p. 9-4.

Note the emphasis on *"lowering"*. A cargo boom must, however, lower, raise, and transfer.

Sprengel would not characterize Ashe's davit arm as a boom; a cargo boom must not only move up and down, but to port and starboard.[22]

Bebler felt that Ashe's davit had no bearing on the invention in suit. It was designed for special purposes not applicable to heavy lift cargo gear.[23]

Although Stiglich testified that he thought that the pendulum was obvious in view of Ashe, the old fork, and Lehmann '222,[24] he admitted that Ashe was primarily related to lowering;[25] that if the cleat were placed as shown in the patent drawing, it would cause the line to wrap around the "boom";[26] and that a "fair lead" would be required.[27] After some apparent evasion,[28] he finally admitted that the hauling parts of the tackle in the Ashe patent were guided from the top of the davit arm down to another portion of the davit arm, and not guided away from the davit arm.[29] Claim 14 of '390 calls for guide means for directing the hauling parts of the purchase tackle "away from" the boom. While Stiglich referred to having seen one arm of the equivalent of the Ashe davit used, it was only to lift an undescribed load, which was pulled by a tag line to an open lower deck[30]—a far cry from a cargo boom lifting cargo out of or lowering it into, a hold, and capable of swinging through to service another hatch.

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[22] Sprengel, Tr. 273.

[23] PX 123, p. 65.

[24] Tr. 2262-63.

[25] Tr. 2060.

[26] Tr. 2085.

[27] Tr. 2097.

[28] Tr. 2094-97.

[29] Tr. 2449.

[30] Tr. 2088, 2449.

If Knight plus Ashe taught all that was necessary to know to develop a cargo boom to service two holds, no patents for rotary, fork, pendulum or other gears for the same purpose should ever have issued.[31]

d. Lehmann Patent 3,042,222 (PX 36).

This patent, issued on July 3, 1962, on application filed April 13, 1959, relates to the "gallows" boom previously mentioned. It is worthy of more than footnote emphasis that while the preferred structure is mounted on a turntable, Claims 1, 2 and 5 do not refer to a turntable. Compare this with the criticism of Figures 10 and 11 of the patent in suit.

The Court would be inclined summarily to dispose of citation of Lehmann '222 on the contention of obviousness, since at the trial and in argument and briefing it was treated by defendant as a two-legged "boom" mounted on a turntable. The upper cargo block "is *pivotally* mounted at the head of the boom to permit the cargo purchase to swing from one side of the boom when shifting from one hatch to another . . ."[32]

It has been shown that efforts to meet the problem of shifting a cargo boom to serve two hatches without rerigging had been attempted by rotating heads on the tops of booms; by rotating the boom on a pivoted base; and Lehmann '222 adds a turntable to rotate the boom and winches. But the arrangement of Lehmann '222 by which the boom and winches are rotated, pivotal mountings being provided to permit the cargo purchase to swing from one side of the boom to the other side in this process, is completely different from the patent in suit, where the boom does not rotate, but moves fore and aft, and the cargo purchase does not pivot or swing from one side of the boom to the other, but pendulates with the fore and aft swing of the boom, always remaining on the same side(s) of the boom.

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[31] Including that issued to Sperg of Sun, processed by Grace's attorneys, who did not feel obligated to disclose this allegedly completely anticipating art to the Patent Office.

[32] Defendant's Brief after trial, p. 33, emphasis added.

The processes and concepts are completely different; and while Lehmann '222 may well have been anticipated or at least made obvious by the prior art, this is not true of Sprengel '390.

Defendant seems to be properly sensitive as to the practicality of Lehmann '222, which has never been pragmatically demonstrated.

The Court is fully aware of the rule that the issuance of a patent creates a "presumption" that the structure disclosed is operative. Simmons Company v. A. Brandwein & Co., 250 F.2d 440, 447 (7 Cir. 1957).

Even if Lehmann '222 were practical, the Court would still be clearly of the opinion that it did not make Sprengel '390 obvious. Despite its reliance on the presumption of operability from the mere issuance of a patent, defendant devotes approximately one-third of its total argument on obviousness to an effort to show that Lehmann '222 *is* operable.

First, it is argued that skepticism as to the attack on operability of the Lehmann '222 patent "should be particularly great" since the patentee was a naval architect "and is known to have actually designed the successful rotary two hatch cargo gear" of United States Patent No. 3,107,790 "which was actually placed on operating vessels of Prudential Lines . . ."[33]

However:

(1) The fact that an inventor has one practical invention does not necessarily mean that another patent of the same inventor is operable.

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[33] Defendant's Brief after trial, p. 35.

(2) The "successful two hatch rotary gear" is covered by a patent in which the filing date is after the filing date of '222, and its date of issuance is after that of '222. It might just as plausibly (or implausibly) be argued that Lehmann realized the impracticability of the device ultimately covered by '222, and went to a different rig in '790.

(3) The "successful rotary two hatch cargo gear" of '790 was installed on only two ships on a "two for the price of one" deal. A rather modest success.

(4) The Lehmann '222 gear has never been installed on any ship.

Second, the gallows rig was listed in a "Cargo Handling Study" prepared by George G. Sharp, Inc., for the Maritime Administration. Although Stiglich had been associated with the Sharp organization, he was not familiar with the calculations, if any, made by Sharp and made no attempt to familiarize himself with them before testifying; and had never discussed the usefulness or feasibility of the gallows-type design prior to his contact with this suit.[34]

Third, defendant discusses at length the testimony as to the practicality, or impracticality, of the Lehmann '222 rig. In this connection some language difficulties were apparent in Sprengel's testimony, in which he stated that he first faced the English word "impractical" in this Court.[35] The Court believes it fair to say that his final conclusion was that while an operative gallows-type gear could be constructed, the cost of construction and maintenance of Lehmann '222, as compared with the pendulum rigs, would make the Lehmann '222 impractical from a business or economic standpoint.

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[34] Tr. 2327.

[35] Tr. 2621.

Appendix B

Admittedly, rotating platforms can be and have been used for the support of cargo blocks secured to a crosspiece at the upper end of the two parallel sides of a "boom", which do not swing over center.[36] There is no evidence that they have ever been, or could be, used for a 120 ton load.

Sprengel took the position that the boom of Lehmann '222 is deficient due to torque caused by the topping lifts [37] when the boom is trained out and the force in the shorter of the topping lifts has gone to zero. Despite Stiglich's denial that zero force does exist in the Lehmann gear,[38] Sprengel demonstrated its possibility on the electric model of the '390 gear.

Although Stiglich offered detailed computations relating to the gallows design, they did not include many elements, such as three-dimensional forces, torque, deflection, or calculation of the gooseneck design.[39]

The model of Lehmann '222 was built from a sketch prepared by Stiglich, who checked it, and had the wiring [40] changed.[41] As rigged, the gear could be used for light cargo only.[42] Moreover, because of the rotating platform, Lehmann '222 would require the use of separate winches for auxiliary, or lighter cargo, booms.[43]

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[36] PX 123, pp. 82-93.

[37] The topping lifts control the motion of the boom in lowering, raising, and/or going from side to side.

[38] Tr. 2235. Stiglich's testimony indicates that because in the United States (contra Germany) calculations are made only on the main outreach, he did not calculate the stresses that would occur if the gear were subjected, unintentionally or advertently, to operation beyond that contemplated in ordinary operations.

[39] Tr. 525, 2382, 2409, 2509-19, 2590—Sprengel.

[40] The way in which the wire rope is run through the blocks.

[41] DX 69; Tr. 2130.

[42] Tr. 2156.

Were it necessary to choose, the Court would hold that, while at great expense Lehmann '222 could be made workable, it would be definitely inferior to the Sprengel '390 pendulum; a conclusion which it shares with (or is shared by) the shipping industry.

(5) Patent as valid reference irrespective of actual use.

While admitting that the gallows rig of Lehmann '222 has never been used, defendant argues that this does not detract from the effectiveness of the teaching of that patent. The short answer is that the use of a rotary table, requiring the turning of the boom by 180° does not teach the use of pendulum gear, and a raising and lowering of the boom fore and aft on a gooseneck.

The cases cited by defendant do support the proposition that a paper patent is relevant on obviousness, but the primary thrust has been where the paper patent was an anticipation. National Filters, Inc. v. Research Products Corp., 384 F.2d 516, 518 (5 Cir. 1967); Morton v. Ladd, 218 F.Supp. 824 (D.C.D.C. 1963); B. F. Goodrich Co. v. United States Rubber Co., 147 F.Supp. 40, 63 (D.Md. 1956) affirmed 244 F.2d 468 (4 Cir. 1957). The *Goodrich* case at page 63 and the therein cited cases of Western States Machine Co. v. S. S. Hepworth Co., 147 F.2d 345, 350 (2 Cir. 1945) and Zephyr American Corporation v. Bates Manufacturing Co., 128 F.2d 380, 385 (3 Cir. 1942), dealt only with the use of paper patents for the Section 102 defense of anticipation.

(6) Manner of conceiving the rig.

Defendant argues that "it is evident that the conception of the rig of the patent in suit was not in response to any serious and long unsolved problem",[44] on the ground that the problem of swing through without re-rigging had been "solved" by a number of earlier rigs such as the old fork, and rotary gear. It certainly had not been completely satisfactorily solved, as shown by the fact that the old fork, although highly successful commercially, was immediately superseded by the pendulum gear. The lack of complete satisfaction is shown by the Sperg patent by an employee of Sun, No. 3,286,851, issued November 22, 1966 on application filed November 6, 1964.

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[43] Tr. 2454.

[44] Defendant's Brief after trial, p. 49.

Defendant again adverts to the short period involved in the conception and birth of the pendulum rig. While the period of gestation may vary from two years in elephants to nine months in humans to days with fruit flies, this Court has been cited to no authority, and is aware of none, that equates novelty and usefulness with length, or shortness of time. As Sprengel aptly put it, "You either have it, or you don't have it." He had it.

(7) Independent development of three separate rigs.

Defendant contends that "three separate pendulum swing through rigs were developed independent of plaintiff and Mr. Sprengel."[45] This appears to be inconsistent with defendant's immediately preceding contention, noted above, that Sprengel's conception was not in response to any serious and long unsolved problem. If this were a correct appraisal, at least four persons wasted a very substantial amount of time and money on a non-existent problem.

The three rigs mentioned by defendant are:

(a) A double pendulum gear developed by the East German Warnowwerft yard.

This resembled the double pendulum rig in some respects but the method of fixing the span or topping tackle to the boom differed. The pendulum principle may well have been derived from Sprengel, since Warnowwerft's patent application was not filed until October 1964, while Sprengel's invention was conceived, and the first single pendulum block was sold by Blohm & Voss, in 1963.

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[45] Defendant's Brief after trial, p. 53.

Moreover, at the request of Warnowwerft, Sprengel discussed the double pendulum in 1967 or 1968. "They asked us if we could have some agreement."[46] Warnowwerft took a license (DX 25).

(b) Sperg patent No. 3,286,851.

Sperg, a Sun employee, in June of 1964, prepared a sketch of a double pendulum rig. This was abandoned, and the patent issued to Sperg does not have a pendulum fitting.[47] This would seem to the Court clearly to negative obviousness. Sperg's first sketch of double pendulum fitting, and his abandonment thereof, and the securing of a patent for a different gear, show that he did not regard the pendulum device as the "obvious" solution to the swing-through problem. Sprengel did.

Moreover, Sun did not install the Sperg patented gear on the Santa Lucia class, or any other vessel constructed by it.

(c) Stiglich.

Defendant states:

> "Mr. Stiglich is the third independent person to come up with the basic concept of the Sprengel invention. He conceived a heavy lift rig with sheaves mounted at the head of the boom which was in principle identical to the Sperg rig as shown in plaintiff's Exhibit 68 (R. 2241-6). Mr. Stiglich's independent conception was approximately the second quarter of 1964 (R. 2241-A)".[48]

What Stiglich in fact said was that in the latter part of 1963 in considering heavy lift gear for an American President Lines, ship, he had experienced difficulty with the Stulcken fork-type boom; the engineering manager for American President Lines was quite disturbed at the forks, which he felt "were ridiculous in some respects". Stiglich did a little study, and "came up with an idea of putting a pin through the head of the boom, and mounting sheaves on it and providing tackle on each side of the boom in the form of a split hoist." He showed the model he had made to Klewsaat of MacGregor in the second quarter of 1964, and showed him "a couple of sketches of the solution to the fork, who then showed drawings for a patent application for the single pendulum rig".[49]

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[46] Tr. 1582-83.

[47] Defendant's Brief after trial, p. 56.

[48] Defendant's Brief after trial, p. 57.

Stiglich then testified that the "idea of the principle" in the Sperg patent was identical to one he had, "in that it had the cross pin through the head of the boom with multiple sheaves and the split cargo hoist" but he had not worked the idea out in as much detail as shown in the Sperg patent.[50]

The importance Stiglich attached to this "idea of the principle" is shown by the fact that he did not retain the sketch, or a copy of it; he thought he might have left it with Klewsaat.[51]

Klewsaat categorically denied ever receiving any such sketch from Stiglich.[52]

Notably, there is no claim by Stiglich that his sketch showed any pendulum gear.

By way of summary, despite shear legs and Ashe, no one (including the designers of rotary heads, rotary booms and rotary platforms) prior to Sprengel came up with pendulum gear for a boom handling 120 ton or heavier loads, capable of servicing two hatches without re-rigging.

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[49] Tr. 2241A.

[50] Tr. 2242.

[51] Tr. 2243.

[52] Tr. 2717-18; 2723-24.

Unobviousness is further demonstrated by the reaction of those skilled in the art when they learned of Sprengel's invention. Bebler thought the invention was "new and novel".[53]

Hamburg America Line, the purchaser of the first pendulum-block gear, was so skeptical that Sprengel was forced to agree that if the pendulum boom did not operate as represented, he would replace it with a fork-type gear. No replacement was made or demanded.[54]

If the pendulum were so obvious, Sperg's "invention" would have been even more so. Yet Sperg obtained a patent, in the prosecution of which defendant's counsel did not direct the attention of the Patent Office to shear legs and davits—now so heavily relied upon. (Defendant's counsel deny then knowledge of shear legs and davits now relied upon. Defendant's Reply Brief, p. 11.)

[2] The case is one in which all the data urged in support of obviousness were available to every one; but only Sprengel came up with a pendulum. Simple as that device may seem in the light of hindsight, it escaped all others. Simplicity, instead of an objection to invention, may constitute its great excellence and value. "It only remains now for the wisdom which comes after the fact to teach us that . . . [Sprengel] discovered nothing, invented nothing, accomplished nothing." Carnegie Steel Co. v. Cambria Ivan Co., 185 U.S. 403, 446, 22 S.Ct. 698, 715, 46 L.Ed. 968. See also Diamond International Corp. v. Walterhoefer, 289 F.Supp. 550, 552-553, 563-564 (D.Md. 1968) and cases cited.

[3] The Court unhesitatingly holds that even apart from commercial success,[55] Sprengel's Patent '390 is valid under the requirements of United States Code, Title 35, Section 103.

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[53] PX 123, pages 53-4, 65.

[54] Tr. 576-7.

[55] PX 52 and 52A; Tr. 681-688.

Appendix B

FAILURE OF CLAIMS TO RECITE AN OPERABLE STRUCTURE

[4] This contention, that the claims of '390 fail to meet the specificity of United States Code, Title 35, Section 112, involves a logical inconsistency with the contention that the patent is invalid on the ground of obviousness. Certainly one "having ordinary skill in the art" would find it obvious not to develop [56] an inoperative structure. If the pendulum gear were obvious, it must be operative.

Further, the argument advanced that Lehmann '222 is presumed to be operative merely because the patent issued, even although it had never been used, would apply with even greater force to '390, on which not only has a patent issued, but substantial commercial success has been achieved.

With the authorities cited by defendant that a claim to be valid must recite a structure that is capable of performing its purported function there can be no quarrel. No purpose would be served by citing them, or supplementing them.

Apparently the charge of inoperativeness is limited to claims 14, 15 and 18 which are in terms directed to a double pendulum rig.[57] The charge is primarily directed to the failure of the claims to call for

(a) a single runner, and to define the structure for transferring the runner from one purchase block fitting to the other purchase block fitting by an equalizing sheave arrangement.

To this there are several replies.

(i) Perhaps ad hominem, as drafted and filed by Sun's counsel, Claim 1 of Sperg's application did not claim an endless rope or cross-over sheave; and as allowed does not refer to a cross-over sheave.

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[56] The term "develop" is used rather than "invent", because if the structure were inoperative, it would not be "novel" or "useful".

[57] Defendant's Brief after Trial, p. 61; except insofar as plaintiff contends that Claims 1-3 are broad enough to cover the double pendulum, in that the fittings are mirror images, and that equalizing means are old and well-known in the art.

(ii) The double pendulum can be operated without an endless rope and cross-over sheave, although it is doubtful if this would be satisfactory in ordinary use.[58]

(iii) Knight clearly shows an equalizing sheave. Old and well-known elements need not be included in claims Rohm & Haas Co. v. Roberts Chemicals, 245 F.2d 693, 697 (4 Cir. 1957).

(iv) This element is adequately disclosed in the specifications and drawings.

Failure to recite:

(b) A structure permitting the upper purchase cargo blocks to move transversely. Admittedly, although the patent discloses a pin fitting permitting this movement,[59] the claims contain no specific reference thereto.

In addition to Rohm & Haas, *supra,* see Proctor & Gamble Manufacturing Co. v. Refining, Inc., 135 F.2d 900, 906 (4 Cir. 1943).

This particular element is not part of the invention and should not (and probably could not properly) have been incorporated in the claims.

Sprengel as Patentee and Employee

Defendant contends that the weight of Sprengel's testimony is greatly lessened by the fact that he is not only the patentee of '390, but also is an employee of plaintiff.

The Court observed Sprengel over extended periods of time as a witness. He impressed the Court as one of the most forthright and honest witnesses the Court has seen as a judge or in private practice.

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[58] Tr. 1523-27.

[59] Defendant's Brief after trial, p. 65.

Of the rather nit-picking items cited by Defendant, only one justifies a specific examination. This is the assertion that Sprengel was less than candid in stating the inventors of the old fork patent. In fact, he offered a completely satisfactory explanation of how the patent as issued happened to include the names of three inventors. (Tr. 1437-9).

Application was made in Germany for a patent on a rotary rig, of which patent Kohnenkampf, Sprengel and Tietgen were co-inventors. Later an addendum was filed, apparently properly under German law, to add the old fork, the invention of Sprengel only. The combined application was filed in the United States. Later the rotary part was withdrawn, leaving only the fork. By oversight, the names of Kohnenkampf and Tietgen were not stricken.

Application was filed in the Patent Office for a certificate under 35 U.S.C. 256 and Rule 324 deleting the names Johann Dietrich Kohnenkampf and Hans Peter Tietgen as joint inventors in Patent No. 2,914,193. Counsel for plaintiff have been advised by the Patent Office that the certificate of correction has been approved and will be issued in due course. The change in priority date from February 11, 1954 to April 5, 1954, is clearly non-prejudicial to defendant. It is unnecessary to consider whether the change could have been made in this Court, under Iowa State University Research Foundation v. Sperry Rand Corp., 444 F.2d 406 (4 Cir. 1971).

The Court finds as fact and concludes as a matter of law that Patent No. 3,236,390, and Claims 1-3, 14, 15 and 18 are valid.

ALLEGED MISUSE OF PATENT

[5] Having found Patent '390 to be valid, normally the Court would proceed to the question of infringement. However, defendant with more than ordinary vigor and earnestness, urges that the patent is unenforceable because of misuse—conduct with regard to the patent that is beyond

the scope of the patent monopoly. If this be true, the patent is unenforceable, however egregious the infringement, until the misuse is purged.

[6] Defendant has standing to raise the misuse defense, even though it is not a licensee. Morton Salt Co. v. G. S. Suppiger Co., 314 U.S. 488, 493-494, 62 S.Ct. 402, 86 L.Ed. 363 (1942); Rocform Corp. v. Acitelli-Standard Concrete Wall, Inc., 367 F.2d 678 (6 Cir. 1966); Berlenbach v. Anderson and Thompson Ski Co., 329 F.2d 782 (9 Cir. 1964); Baldwin-Lima Hamilton Corp. v. Tatnall Measuring Systems Co., 169 F.Supp. 1 (E.D.Pa. 1958), aff'd per curiam, 268 F.2d 395 (3 Cir. 1959).

The alleged misuses are claimed to be:

1. International patent agreements, violating the antitrust laws, resulting in an unlawful division and allocation of markets, restraining the foreign commerce of the United States.

2. Requiring MacGregor to pay royalties on unpatented masts.

3. Tying unpatented material and services to the patent.

4. Precluding the licensee from challenging the validity of plaintiff's patents.

Of course, the burden of proof is on the defendant, the proponent of the issue. White Motor Co. v. United States, 372 U.S. 253, 259, 83 S.Ct. 696, 699, 700, 9 L.Ed.2d 738 (1963). United States v. Grinnell Corp., 236 F.Supp. 244, 248 (D.R.I. 1964); aff'd, 384 U.S. 563, 86 S.Ct. 1698, 16 L.Ed.2d 778 (1966); Sperry Products, Inc. v. Aluminum Company of America, 171 F.Supp. 901, 936-938 (N.D.Ohio 1959), mod. and aff'd, 285 F.2d 911 (6 Cir. 1960), cert. den. 368 U.S. 890, 82 S.Ct. 139, 7 L.Ed.2d 87 (1961).

Appendix B

1. Plaintiff's International Agreements in Violation of the Antitrust Laws Result in an Unlawful Division and Allocation of Markets, Restrain the Foreign Commerce of the United States and Illegally Insure Plaintiff's Monopoly Position.

In support of these propositions, defendant asserts:

(a) Plaintiff dominates the market.

Confining itself to two-hatch rigs, defendant points out that of the 272 installations of two hatch gear (excluding defendant's gear in issue) 221 have been plaintiffs, or 81%. Of the remaining 51 rigs, 23 are Newport News (Sparrow) rigs, 2 are Lehmann rotary rigs, 20-25 are German gears, and one a Japanese rig. The Lehman gallows rig has not been installed anywhere.

Of the 79 two-hatch rigs installed in the United States, plaintiff accounts for 54, or 68%, with Newport News (Sparrow) accounting for 23 of the remaining 25.[60]

Several comments are in order:

(i) Two-hatch gear is not the relevant market. United States v. Charles Pfizer & Co., 246 F.Supp. 464, 468-470 (E.D. N.Y. 1965); United States v. Charles Pfizer & Co., 245 F.Supp. 737, 739 (E.D. N.Y. 1965); United States v. E. I. Du Pont De Nemours & Co., 351 U.S. 377, 393, 76 S.Ct. 994, 100 L.Ed. 1264 (1956); United States v. Grinnell Corp., 236 F.Supp. 244, 250 (D.R.I. 1964); Diamond International Corp. v. Walterhoefer, 289 F.Supp. 550, 576-577 (D.Md. 1968).

In fact, the revelant market is heavy lift cargo gear for ships. This includes conventional gear, as well as the rotary head, rotary mast, turntable, bipod, fork and pendulum gears. The owner who contemplates building a ship has an extensive choice. Probably cost and serviceability are the determining factors.

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[60] PX 81.

(ii) Sprengel (Stulcken, Blohm & Voss) have been in the forefront of the development of heavy lift gear. It is a reasonable inference that their gear has been selected for its performance. In fact, a pendulum gear was installed on the Transcolorado to serve a single hatch.

(iii) The Buy American requirements as to American subsidized ships (46 U.S.C. section 1155) certainly make the various gears, such as the German Stulcken, truly competitive.

(iv) Conventional and more advanced and specialized gear are alternatives in designing a ship. The differences between their characteristics are less than between cellophane, foil, wax paper, glassine and polyethylene; or between citric, tartaric, fumaric, lactic and phosphoric acids, lemon juice and vinegar; or paper board and molded pulp egg cartons.

Even assuming that two-hatch gear is the relevant market, plaintiff's 68% [61] share of the domestic market is not surprising or improper; plaintiff literally created the market, providing (especially in the fork and pendulum devices) superior gears. Plaintiff lawfully [62] acquired United States patents on the only gear (fork and pendulum types) its licenses ever sold. Both its design and manufacturing quality are superior.[63]

Shipowners have specified such gear; e.g. Hansa, Hudson Waterways. The defendant itself specified plaintiff's gear (then the fork-type).

Somewhat remarkably, defendant in its 26 page reply brief on validity and misuse, devotes two and one-half pages, but not under the topic of misuse, to the argument that commercial success is not such as to support patentability. While admitting that no sales of the old fork-type have been made since the introduction of the pendulum rig, defendant asserts that the single pendulum is already obsolete, and that no sales have been made of the rigs covered by the '390 patent since May 1967. This is ascribed primarily to the present trend toward containerships; and "orders for other types of gear not covered by the patent . . ." (Defendant's Reply Brief, p. 14).

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[61] The 68% does not take into consideration the 12 gear sets on defendant's ships, and another on the S/S Admiral Callahan (PX 173) built by Sun, and which it contends do not infringe. If they do not, they are clearly competitive.

[62] See previous discussion of the correction of the erroneous listing of inventors. This cross-cuts defendant's several references in the Misuse section of its brief to the "invalid" fork patent.

[63] Bebler, PX 123, p. 47.

It would be hard to make a stronger argument that the gear of the patent in suit does not have monopolistic control, or the possibilities thereof. Defendant's argument in this respect also seems inconsistent with the contention that two-hatch gear is the "relevant market".

Defendant cites the "web" of agreements covering the major ship building countries of the world, including agreements with:

> MacGregor-Comarian, Inc. (DX 17 and DX 19)
> Nissho Company, Ltd. and Lateno Seisakusho and Company Limited of Japan (DX 23)
> Warnowwerft Warnemunde of East Germany (DX 25)
> Constantine and Co. Ltd. of England (DX 27)
> Delta of Yugoslavia (DX 28) and
> International MacGregor (IMGO) (DX 29 and DX 20—expired in 1969).

Defendant contends that these agreements unlawfully divide and allocate the world-wide market for two-hatch cargo gear, by the insulation of each license in its own territory from competition with each other licensee with respect to any mast structure covered in any country by a patent held by plaintiff or one of its licensees. This allegedly eliminates price competition, sustains plaintiff's royalty structure, and restrains the foreign commerce of the United States.

So broadly stated, defendant would seem to attack the validity of more than one territorially restricted exclusive license. Obviously, if plaintiff were large enough, it could operate world-wide independently.

Defendant seeks generally to group these together, as if their contexts, contents and scope were similar. They will be considered in the order listed.

As defendant places principal emphasis on the MacGregor agreement, the only one with a United States corporation, it is interesting to note the origin of this relationship.

The plaintiff builds ships in its yard at Hamburg, and manufactures and installs squipment for such ships, including heavy lift cargo gear of several kinds. It has entered into agreements with various non-German companies for the manufacture, and/or representation as its agents for the sale, of heavy lift cargo gear of its design.

MacGregor is a small company having 25 employees which supplies equipment to the maritime industry. Its primary business is in hatch covers, but it also supplies cargo gear of the conventional type, the bipod type and the fork and pendulum-block types of two-hatch gear of plaintiff's design. MacGregor has no manufacturing facilities of its own. It sub-contracts the manufacture of specially fabricated items and buys standardized parts from others (Klewsaat, Tr. 1613, 1642, 1694; Sprengel, Tr. 841).

Plaintiff's first contact with the United States market for cargo gear was in supplying in 1959 the fork-type gear for the Del Rio class of ships built in the Avondale yard for the Delta Line (Sprengel, Tr. 1443). MacGregor acted as a sales agent (Sprengel, Tr. 1444). Plaintiff then learned of the "Buy American" Act whereby not only must a ship built under subsidy from the Maritime

Administration be constructed in a shipyard of the United States, but the equipment installed on it must be produced or manufactured here (46 U.S.C. Section 1155). In fact, the gear supplied to the Delta Line was permitted under a special waiver, and with the knowledge that such practice could not be continued (Sprengel, Tr. 1442-3, 1446; Klewsaat, Tr. 1621-23, 1627; Bebler, PX 123, p. 147).

Later, when the Challenger class was to be built for the United States Lines, MacGregor requested a manufacturing license from plaintiff in order to be able to offer gear of plaintiff's design to shipyards in the United States in view of the By American Act (Zeitlin, DX 81, p. 72).

The arrangement between plaintiff and MacGregor strated out informally, but was formalized in a 1962 agreement (DX 14, 16; Sprengel, Tr. 1431-2). After plaintiff acquired Stulcken and in view of the expiration by its terms of the 1962 agreement, the current agreement (DX 17, 19) was executed in 1967. Defendant examined Zeitlin and Klewsaat at great length during their depositions regarding the negotiations underlying the 1962 and 1967 agreements, respectively, but did not adduce any testimony of plaintiff conditioning a license on MacGregor's paying money on, or being required to purchase, unpatented goods or services (Zeitlin, DX 81, e.g., pp. 52, 56, 77, 92-93, 117-20, 113-4, 146-9).

(1) The MacGregor agreement (DX 17) grants MacGregor the exclusive right to manufacture and sell, and with plaintiff's prior written approval to cause to be manufactured and sold, cargo handling gear covered by patents owned by plaintiff and listed in Exhibit A to the agreement. It also grants the right to use any improvements, modifications and new inventions controlled by plaintiff; to make, use or sell in its Territory any patented or unpatented inventions, processes or devices owned or controlled by plaintiff; and to acquire from plaintiff all parts and ancillary equipment required by MacGregor.

Appendix B

MacGregor's "Territory" is defined as the United States of America and its territories and possessions, and Canada and Mexico. This is the area as to which Klewsaat testified that MacGregor could compete effectively. (Tr. 1692).

Defendant contends that these grants illegally preclude MacGregor from exporting structures of patents not patented in the United States to another country in which they are not patented. Elliott Co. v. Lagonda Manufacturing Co., 205 F. 152, 157 (W.D.Pa. 1913), aff'd 214 F. 578, 580 (3 Cir. 1914). There the courts held that language in a settlement agreement between competitors operating in foreign countries that one of the parties licensed "to make, use, and sell to others for use throughout the United States" limited its activities to the United States.

[7, 8] The grant of an exclusive license to make and sell a device under patents, trademarks and know-how within a defined area does not of itself constitute a prohibition from selling on a non-exclusive basis outside that area. United States v. L. D. Caulk Company, 126 F.Supp. 693, 707 (D.Del. 1954). Where such prohibition is intended, it can be expressly stated, as in Brownell v. Ketcham Wire & Manufacturing Co., 211 F.2d 121, 124 (9 Cir. 1954);[64] or implicitly as in the Lagonda cases, *supra.*

In the MacGregor license, the exclusive rights granted MacGregor in the Territory meant that plaintiff could not, so long as the MacGregor agreement was in effect, grant anyone else the right, or itself exercise the right, to manufacture and sell within that Territory. United States v. L. D. Caulk Company, 126 F.Supp. 693, 706-707 (D.Del. 1954).

The license also includes "the exclusive right for sale of Stulcken Masts manufactured and installed outside the Territory to" owners of vessels, and naval architects and consultants having their principal place of business in the Territory. (DX 19, p. 4).

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[64] Also holding exclusive licenses to be valid. 211 F.2d at 129.

Appendix B

Section 12 provides for a "Commission", as distinguished from "Royalty", dependent upon whether plaintiff manufactures the masts, or only supplies designs for masts, for installation outside of the Territory.

MacGregor has been involved as sales agent with respect to the sale of gear of plaintiff's design to Brazilian and Chilean shipowners. (Tr. 1640-41; DX 81, pp. 210-14; 255-56).

(2) Nissho—Tateno (DX 23).

Defendant correctly characterizes it as a "complex agreement".[65]

It also, much more questionably, describes it as an agreement which restrains trade between Japan and most countries including the United States and unlawfully divides markets affecting the foreign commerce of the United States.

The agreement recites the ownership by plaintiff of certain listed patents and that it has information and data ("know-how") including drawings, plans and specifications for the design, manufacture and installation of the Stulcken mast; that plaintiff is willing to grant and "Nissho wishes to agree to a sales agreement and Tateno wishes to manufacture certain parts of the mast . . .".

Plaintiff appointed Nissho as its agent for the masts covered by the Addendum and the know-how gained by plaintiff, and Nissho agreed during the term of the agreement not to produce, sell or represent any other type of cargo gear. Nissho was given Japan on an exclusive basis, and "Cambodge [sic], China, Indonesia, Laos, Malaysia, North and South Vietnam, Philippines, Republic of Korea, Thailand, Union of *B*erma, and Formosa" on a non-exclusive basis; i.e., Blohm has the right to sell masts or parts thereof direct and/or appoint any other sales representative and/or licensees in these territories.

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[65] Defendant's Brief after trial, p. 77.

The language is unique, and leaves much to be desired. Sprengel does not understand Japanese; the Japanese did not understand German, and so the agreement was prepared (by an understandably anonymous scrivener) in English.

Nissho was authorized to sell to Japanese shipbuilders and shipowners and to non-Japanese shipowners "in case they build and/or convert ships" by shipbuilders in Japan.

Nissho is not allowed to sell, export or re-export the masts or parts thereof except in Asian countries above recited, and undertakes to impose on "his" customers a condition not to export the masts or parts thereof and shall be liable to Blohm "that none of the customers as indicated . . . above exports the mast previously purchased by Nissho from Blohm respectively Tateno." [sic]

Blohm "authorized Tateno as the exclusive manufacturer of fittings and accessories of the mast in the territory." To the extent that Blohm does not supply fittings and accessories to Nissho, they are to be purchased by Nissho exclusively from Tateno.

Included in the Addendum were all the masts disclosed in all of plaintiff's patents, although no Japanese patents were then held by plaintiff.

Nissho and Tateno asked for licenses to manufacture and sell because of Japan's currency restrictions and the expense of shipping heavy gear overseas into Japan. (Tr. 843-8, 1309, 1493-4).

There is no evidence that Nissho—Tateno were or are involved in the United States in any way, or that any domestic manufacturer was supplying, or attempting to supply, heavy lift gear to the Japanese market.

(3) VEB Warnowwerft, Warnemunde, German Democratic Republic (DX 25).

Defendant devotes six lines of its Brief (pp. 79-80) to this license, asserting that it forbids competition with plaintiff, since it restricts Warnemunde to installations in East Germany by virtue of the limiting grant of paragraph 1 to

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"new construction and for rebuilding in or for the GDR (German Democratic Republic)".

The language quoted by defendant is from Item 1, headed "Subject of the Contract".

Item 2 is headed "Contractual Territory". Paragraph 1 reads as follows:

> "The licensee is given the right to use the license—products according to item 1 in those countries in which the licenser has applied—for and granted protected rights. This use comprising the use and marketing of the subjects of the licensee in all countries in which the licenser owns no protected rights is unaffected hereby."

VEB had a contract with a French owner who had specified Stulcken masts or equal. Plaintiff had a French patent, and VEB, despite its own patent, asked for a license agreement. A naked license was granted, without technical assistance or know-how; and VEB was not permitted to use the Stulcken name (Tr. 1516-19).

(4) Constantine & Co., Ltd. (DX 27).

Although listed as part of the "web", this agreement receives not even one line of discussion in defendant's Brief.

Under the agreement, Constantine is appointed sole agent for the Stulcken Mast in the United Kingdom, on a straight commission basis. Different rates of commission are payable on deliveries and license and drawing fees.

The license does not in terms forbid competition.

(5) DELTA Inostrana Zastupstva, Serivisi, Kosignacije, Rijeka, Yugoslavia (DX 28).

Delta is given an exclusive sales agency for Yugoslavia on a straight commission basis, and (not unreasonably) "is obligated to refrain from any competition with B & V . . ."

(6) International MacGregor Organization (DX 29, 30).

Starting as a world-wide exclusive license to manufacture and sell heavy load handling gear on January 22, 1957, it was reduced to "France and the U.S.A." on January 14, 1960, and terminated as of January 22, 1969.

Defendant's only discussion in its Brief (p. 80) is:

> "Similarly the IMGO agreement by implication restricts IMGO's territory to France with IMGO agreeing (Section 5) not to 'benefit by the fact that the Stulcken mast is not protected by patent rights in France.' "

A specific restriction to "France and the U.S.A." does not seem to import, or support, a restriction to France.

The significance, or even the meaning, of the statement that IMGO is not to "benefit" from absence of patent protection in France is unexplained.

(b) Division of Markets and Elimination of Competition—Sherman Act, Section 1.

In support of the proposition that an agreement to divide markets is a violation of Section 1 of the Sherman Act, defendant cites United States v. National Lead Co., 63 F.Supp. 513 (S.D.N.Y. 1945), aff'd 332 U.S. 319, 67 S.Ct. 1634, 91 L.Ed.2d 2077 (1947); United States v. Sealy, Inc., 388 U.S. 350, 87 S.Ct. 1847, 18 L.Ed.2d 1238 (1967); and Timken Roller Bearing Co. v. United States, 341 U.S. 593, 71 S.Ct. 971, 95 L.Ed. 1199 (1951).

These cases, however, are clearly and controllingly different from the case at bar. In each, the territorial division was the result of an agreement between competitors for a division of markets in the United States. In National Lead there was a division agreement between three defendants and 19 co-conspirators with respect to titanium oxide and pigments thereof. Of the defendants Dupont produced

76.5% of composite pigments and National Lead 23.5%. Of pure titanium oxide produced in the United States, Dupont accounted for 46.4% and National Lead 41.5%. The agreements involved the splitting of the whole world, and price fixing.

Significantly, even in this situation, reciprocal grant of patent rights, for a reasonable royalty, were approved (332 U.S. at 359-360, 67 S.Ct. 1634).

In Sealy, the licensor, substantially owned and controlled by "licensees", was in fact a joint venture of the licensees. The arrangements for exclusive territories were chargeable to the licensees and were part of an aggregation of trade restraints, including horizontal price fixing and policing of retail policies.

The Court pointed out that the situation was not like "territorial limitations imposed by a manufacturer upon independent dealers as an incident to the sale of a trademarked product." (388 U.S. at 354, 87 S.Ct. at 1851).

The ramifications of Timken have fortunately been capsulized in Sealy as follows:

> "Timken involved agreements between United States, British and French companies for territorial division among themselves of the world market for antifriction bearings. The agreements included fixing prices on the products sold in the territory of the others; restricting imports to and exports of the United States, and excluding outside competition . . ." (388 U.S. at 354, 87 S.Ct. at 1851).

Here, of the six alleged "web" like agreements, only VEB could even arguably be said to restrict manufacture among competitors; and if so construed, there is no showing how it could have affected foreign commerce to or from the United States.

The restrictions in the various agreements seem only to be the exercise by a patentee of his right either to decline to practice its invention; to practice it exclusively itself; to grant a single license or exclusive licenses with or without cross-licensing (Sperry Products, Inc. v. Aluminum Co. of America, 171 F.Supp. 201 (N.D.Ohio, 1959) aff'd and mod. 285 F.2d 911, 925-926 (6 Cir. 1960);[66] cert. den. 368 U.S. 890, 82 S.Ct. 139, 7 L.E.2d 87 (1961), or to grant nonexclusive licenses

The factual situation is equally destructive of defendant's argument.

Heavy gear of the type in question cannot, except in exceptional circumstances, be manufactured except at or adjacent to the shipyard in which is being built the ship in which it is to be installed. With American labor costs, and cargo rates (Tr. 845) such gear, patented or unpatented, could not competitively be manufactured in the United States for installation in Europe or Japan.

Neither Newport News nor the Lehmann rotary gear has ever been exported (Tr. 1692).

The Buy American Act is applicable to substantially the entire United States market for heavy gear. It alone would serve to exclude heavy gear manufactured outside the United States, regardless of the provisions of license agreements.

(c) Monopolization and Attempt to Monopolize—Sherman Act, Section 2.

On monopolization, defendant reiterates its figures as to the percent of the market (on two-hatch gears) attained by plaintiff previously made under (a) above. No further discussion seems required or justified.

Based upon its unproved contention of monopoly, defendant contends that from this an intent to monopolize may be inferred. Apparently abandoning this approach, defendant concludes this "point" with the conclusory allegation that plaintiff "has employed its patents through a world-wide web of agreements, the net effect of which has been an illegal restraint of trade and monopolization under Sections 1 and 2 of the Sherman Act and a misuse of the patent in suit."[67] Section (c) ends on the words with which it began.

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[66] **Cited five times by plaintiff in its Brief after trial, with no rebuttal by defendant.**

In-between, defendant cites and relies upon United States v. Du Pont, *supra*; United States v. Grinnell Corp., 236 F.Supp. 244 (D.R.I.1964), aff'd 384 U.S. 563, 86 S.Ct. 1698, 16 L.Ed.2d, 778 (1966); International Boxing Club v. United States, 358 U.S. 242, 79 S.Ct. 245, 3 L.Ed.2d 242 (1959); and American Tobacco Co. v. United States, 328 U.S. 781, 66 S.Ct. 1125, 90 L.Ed. 1575 (1946). In each of these, as in Du Pont, there had been concerted action by companies previously in active and open competition. They are not, and: " . . . are not comparable to cases where the parties, for example, merely have made a new discovery or an original entry into a new field and unexpectedly or unavoidably have found themselves enjoying a monopoly coupled with power and intent to maintain it . . . " (328 U.S. at 786, 66 S.Ct. at 1128).

(d) Patent Pool.

Defendant contends that the cross-licensing provisions in the MacGregor and Nissho-Tateno agreements are illegal "grant-back" provisions, citing United States v. National Lead Co., 63 F.Supp. 513 (S.D.N.Y.1945); aff'd 332 U.S. 319, 67 S.Ct. 1634, 91 L.Ed. 2077 (1956) and United States v. Associated Patents, Inc., 134 F.Supp. 75 (E.D.Mich. 1955); aff'd per curiam, 350 U.S. 960, 76 S.Ct. 432, 100 L.Ed. 834 (1956). Neither is helpful to defendant, and National Lead is harmful.

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[67] **Defendant's Brief after trial, p. 87.**

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In National Lead, the Supreme Court upheld, against attack by the Government, provisions of the decree permitting National Lead and Du Pont to grant licenses "conditioned upon the reciprocal grant of a license by the applicant at a reasonable royalty . . . " (332 U.S. at 359, 67 S.Ct. at 1653) then "issued or pending, or issued within five years from" the date of the decree. (332 U.S. at 360, 67 S.Ct. at 1653).

In Associated Patents, the formerly competitive dedefendants had organized a patent holding and licensing company, in which were pooled existing and future patent rights, and each defendant had allocated to itself the exclusive right to manufacture and sell certain specified tools.

On the other hand, cross-licensing or even more, has been approved.

In Transparent-Wrap Machine Corp. v. Stokes and Smith Co., 329 U.S. 637, 645, 67 S.Ct. 610, 91 L.Ed. 563 (1947), the Supreme Court held that an agreement licensing[68] machine patents then owned or later acquired by the licensor, could properly contain a provision not merely requiring the licensee to cross-license the licensor, but requiring the licensee to *assign* to the licensor any improvement patents developed by the licensee.

In Sperry Products, Inc. v. Aluminum Co. of America, 171 F.Supp. 901 (N.D. Ohio 1959), aff'd and mod. 285 F.2d 911 (6 Cir. 1960), cert. den. 368 U.S. 890, 82 S.Ct. 139, 7 L.Ed.2d 87 (1961), the Sixth Circuit found no misuse of the patents in suit as a result of a provision for licensing and cross-licensing of foreign patents (285 F.2d at 925-926).

In Binks Manufacturing Co. v. Ransburg Electro-Coating Corp., 281 F.2d 252, 259 (7 Cir. 1960), cert. den. 364 U.S. 926, 81 S.Ct. 353, 5 L.Ed.2d 265 (1961) the Court found no illegality in a license requiring the licensee to assign to the licensor a royalty-free, non-exclusive license with right to sub-license, patents developed by the licensee.

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[68] Coincidentally, the territory licensed was the United States, Canada and Mexico—the same as that licensed to MacGregor.

It, therefore, is unnecessary to consider, although it should be noted, that the parties construe the MacGregor agreement to obligate MacGregor to grant only a royalty-free, non-exclusive grant-back to the plaintiff for use only in its own yard, and limited to the subject matter licensed to MacGregor.[69] Should MacGregor develop an improvement, negotiations would be necessary before plaintiff could extend rights thereunder to any of plaintiff's other licensees (Tr. 1647). Neither MacGregor nor any other licensee of plaintiff has made any such improvement.[70]

Various additional provisions of the MacGregor Agreement—re Misuse.

(a) Defendant contends that paragraph 11 of the MacGregor Agreement (DX 19) requires the payment of a "royalty" on all Stulcken masts manufactured and installed in the "Territory". Zenith Radio Corporation v. Hazeltine, 395 U.S. 100, 135-139, 89 S.Ct. 1562, 23 L.Ed.2d 129 (1969) is relied upon as establishing the illegality of this provision. In that case, however, the Supreme Court made it abundantly clear that what it was condemning was "*conditioning* the grant of a patent license upon payment of royalties on products which do not use the teaching of the patent . . ." (p. 135, 89 S.Ct. p. 1582; emphasis supplied).

This qualification—conditioning—is repeatedly stated.

For example, in approving the injunction granted by the trial court, the Court said:

> ". . . The injunction reaches only situations where the patentee directly or indirectly 'conditions' his license upon the payment of royalties on unpatented products—that is, where the patentee refuses to

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[69] Sprengel, Tr. 1461-63, 1477-78; Klewsatt, Tr. 1646-47.

[70] Sprengel, Tr. 1464, 1477-78; Klewsatt, Tr. 1646.

> license on any other basis and leaves the licensee with the choice between a license so providing and no license at all . . ." (p. 135, 89 S.Ct. 1583).

The word "condition" is used again in pages 136 and 137; and "conditioning" on page 138.

The Second Circuit has taken the above language as controlling. In Glen Manufacturing Inc. v. Perfect Fit Industries, Inc., 420 F.2d 319 (2 Cir. 1970); cert. den. 397 U.S. 1042, 90 S.Ct. 1365, 25 L.Ed 2d 653 (1970), plaintiff had sued defendant under a licensing agreement under which defendant agreed to pay plaintiff a royalty of ten cents on each toilet tank cover made or sold by it. Defendant contended that this applied only to toilet tank covers within the scope of the patent. Plaintiff contended that the agreement contemplated royalties on all toilet tank covers manufactured or sold by defendant, whether or not they were included within the scope of the patent. The trial judge agreed with plaintiff's construction, but held it fatal to enforceability as amounting to patent misuse.

A few days after the trial court's decision, the Supreme Court handed down its decision in *Zenith, supra.* The Second Circuit remanded the case "for further findings on the issue of 'conditioning' and an explicit determination of whether the license agreement amounted to patent misuse under *Zenith.*" (420 F.2d at 321.)

There is no evidence, or proffer of evidence, in this case that the MacGregor or any other agreement was "conditioned" upon the payment of "royalty" upon unpatented material. Nor is there any evidence that MacGregor, defendant, Sun or any one else asked for and was denied a license under '390 alone.

It is also at least arguable that the MacGregor arrangement is valid under Automatic Radio Manufacturing Co. v. Hazeltine, 339 U.S. 827, 833-834, 70 S.Ct. 894, 94 L.Ed. 1312 (1950). There the Court held that a provision that in return for a license by Hazeltine to use any patent (of which there were 570, with 200 applications) or future development in consideration of a royalty on all radio receivers manufactured by the licensee, regardless of whether or not any of Hazeltine's patents were used, was valid. The Court felt that "sound business judgment" might lead to this method as the "most convenient method of fixing the business value of the privileges granted by the licensing agreement." The licensee was not required to use any of the patents, but was free to use any and all.

Here the so-called "royalty" payable by MacGregor was a combined fee for the license of United States patents and foreign patents; a world-wide indemnity against infringement liability; a trademark license; and the furnishing to it of substantial know-how and technical assistance.

From a practical aspect, MacGregor had never, under the 1962 or the 1967 agreement (DX 17 and 19) been requested to build or built any licensed gear which is not patented in the United States; and has never paid any "royalty" or fee to plaintiff in respect of the rotary (Type A) gear (Tr. 1653).

3. Tie-In of Materials and Services.

Defendant contends that Paragraph 4E of the MacGregor license (DX 17) improperly "ties unpatented products, drawings and services to the patent in suit."[71] Paragraph 4E reads as follows:

> "Licensee shall not be entitled to use any components or ancillary equipment of a Stuelcken Mast, whether patented or unpatented otherwise than in connection with a Stuelcken Mast. Licensee shall, however, be entitled to use non-patented components or ancillary equipment for a Stuelcken Mast for similar type of cargo gear, always provided, however, that Licensee shall be obligated to obtain the

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[71] Defendant's Brief after trial, p. 92.

> necessary drawings from Licensor for those not patented components or ancillary equipment against payment for the drawings provided by Licensor."

Defendant freely admits [72] that Paragraph 4E is ambiguous. It further argues that Paragraph 6A requiring MacGregor to comply with plaintiff's instructions, practices, and procedures as to design, manufacture and installation of Stulcken Masts, subject to deviation with consent, requires MacGregor to accept engineering and other services from plaintiff. Defendant seeks to analogize these provisions to Morton Salt Co. v. Suppiger Co., 314 U.S. 488, 62 S.Ct. 402, 86 L.Ed. 363 (1942); Columbus Automotive Corp. v. Oldberg Manufacturing Co., 387 F.2d 43 (10 Cir. 1968); and National Foam System v. Urguhart, 202 F.2d 659 (3 Cir. 1953); and further refers to instances in which MacGregor has obtained engineering services and drawings from plaintiff.

Admittedly, while MacGregor has acquired knowledge from which it could (probably) satisfactorily do the necessary engineering work and designing for ordinary modifications on Stulcken Masts, there are two clearly established aspects. First, plaintiff has an understandable pride in, and concern for, the preservation of its reputation for the finest in cargo masts. Secondly, MacGregor sometimes buys drawings from plaintiff because it does a good job on a competitive price, saving MacGregor the effort of reassigning personnel on its limited staff.[73] Plaintiff's charges for its drawings are negotiated upon the basis of what is required, the estimated engineer and draftsmen hours required, and the hourly charge rates for the type of work used by plaintiff in making drawings for its own use (Sprengel, Tr. 835, 838-9, 1339-45; 1351-52; Klewsaat, Tr. 1634-36; 1761-65).

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[72] Defendant's Brief after trial, p. 93.

[73] MacGregor does not pay for drawings furnished for purposes of bidding on new jobs unless the bid is accepted.

MacGregor is not obligated to buy parts from plaintiff, nor could it do so (ordinarily) on subsidized ships under the Buy American policy. It normally sub-contracts the manufacture of especially fabricated equipment; and buys off-the-shelf component parts from others in the United States (Klewsaat, Tr. 1636, 1642-45, 1702; Sprengel, Tr. 1467-68).

MacGregor is not, in practice, nor by the express terms of the agreement, as construed by the parties, obligated to buy drawings or anything else (Klewsaat, Tr. 1635-36). Section 4C expressly limits payment for drawings to those supplied at MacGregor's request.

Again, there is no evidence of the conditioning of the grant of a license under the patent in suit upon the purchase of drawings or parts from plaintiff.

4. Barring the Raising of the Validity of the Patent in Suit is a Misuse.

Finally, defendant contends that the provisions in the MacGregor and Nissho-Tateno agreements that the licensees may not contest the validity of the patent in suit is, under Lear v. Adkins, 395 U.S. 653, 89 S.Ct. 1902, 23 L.Ed.2d 610 (1969) "a misuse".[74]

In defendant's Brief after Trial, thirteen lines were devoted to this contention; and plaintiff's Reply Brief devoted seven lines to it.

In this Court's opinion, these treatments were consonant with its relative (un)importance. Lear certainly held that a licensee was not, by virtue of a license, estopped to raise the question of invalidity of the patent when sued for infringement. *A fortiori,* clauses specifically negating this right are invalid. Lear expressly overruled Automatic Radio Manufacturing Co. v. Hazeltine Research, Inc., 339 U.S. 827, 70 S.Ct. 894, 94 L.Ed. 1312 (1950). While this Court has some difficulty in following the Lear Court's reference to Hazeltine as "being itself the product of a clouded history",[75] it is of course bound by the holding.

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[74] Defendant's Brief after trial, pp. 97-98.

To this Court it seemed elementary that the decision in Lear struck down the enforceability of the noncontestability provisions in the MacGregor and Nissho-Tateno agreements, as of and from, June 16, 1969, the date of the Lear decision. It did not seem possible to this Court that the striking down of a previously validated provision could invalidate such a contract in toto, particularly in view of the separability claims in each such agreement.[76] Moreover, it did not seem to this Court that any action was necessary on the part of the contracting parties. What could be served by them formally stating: "We agree"; or "We accept and agree to be bound by the supreme law of the land."?

However, in argument, it appeared that defendant's position was not clear. This Court therefore addressed a letter to counsel for plaintiff and defendant, requesting a clarification of positions.[77] From the response it clearly appeared that defendant took the position that the noncontestability clauses rendered the entire license agreements void *ab initio*. There followed the (to the court) somewhat illogical argument that failure by plaintiff to "act" after Lear is a separate ground for finding misuse. Defendant took the position that the "defect" could be "cured" . . . "either by a new agreement or by a written agreement striking the offensive limitation". Apparently defendant contents that the defect (and unenforceability) continues until a "cure" has been effected in one of these two ways.

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[75] One of the two reasons expressly stated as the grounds for certiorari in Hazeltine was the question of estoppel of a licensee to question validity (339 U.S. at 830, 70 S.Ct. at 895). While this Court does not question the propriety of the decision in Lear (and it would be immaterial if it did), the flat holding in Hazeltine will, for the reasons to be stated in the text, be of significance.

[76] MacGregor, DX 17, Section 18B; Nissho-Tateno, DX 23, Section XVIII, second paragraph. Each agreement is for a five-year term.

[77] Copies of the Court's letter of November 30, 1971, and of the joint reply of January 8, 1972, are filed as part of the record.

No authority has been cited by defendant in support of its position that some written step is necessary. To this Court, the effect of Lear is the invalidating of the incontestability clauses, the same as if lines had been drawn through them, or they had been erased or physically excised. Lear did not have to deal with our specific issue, as the restraint was implied from the relationship of licensor-licensee. But the Court did not hold that the license agreement was thereby invalidated, but it permitted nonpayment of royalties during litigation, and stated that defendant would not have to pay royalties accruing after the attached patent issued "if Lear can prove patent invalidity." (395 U.S. at 674, 89 S.Ct. at 1913). Implicit in this is the right to collect royalties if the patent were held to be valid. And see Plastic Contact Lens Co. v. W.R.S. Contact Lens Laboratories, Inc., 330 F.Supp. 441 (S.D.N.Y. 1970), and Kraly v. National Distillers and Chemical Corp, 319 F.Supp. 1349 (N.D.Ill. 1970).

Defendant has no license; has paid and is paying no royalty; and despite the MacGregor incontestability clause was and is free to contest, and as this litigation shows, is vigorously contesting validity; and did so before Lear was decided.

In other fields the courts have had no difficulty in upholding the validity of the balance of a contract which contained a clause valid when made, but later declared to be invalid.

This has been applied in the field of restrictive covenants. In Terry v. Elmwood Cemetery, 307 F.Supp. 369 (N.D. Ala.1969) the Court held that a provision in cemetery lot deeds limiting interment to Caucasians was void and of no legal effect. The Court did not, however, void the deeds, and gave no intimation that any or all of the deeds had to be physically rewritten or amended, or that confirmatory deeds either striking out or omitting the voided language were necessary. It merely declared that the limitation provisions in the lot deeds "are void and of no legal effect."

In Re Port Publishing Co., 231 N.C. 395, 57 S.E.2d 366, 14 A.L.R.2d 842 (N.C.1950) a collective bargaining agreement contained clauses relating to vacation and severance pay, wages, hours, overtime, vacations and closed shop—all valid when the agreement was made. Later the closed shop provision was outlawed by the North Carolina Legislature. In receivership proceedings the remaining provisions were held to be valid and enforceable. There was no reference to need for excision or reformation.

In National Labor Relations Board v. Rockaway News Supply Co., Inc., 345 U.S. 71, 73 S.Ct. 519, 97 L.Ed. 832 (1953) the agreement in question contained no-strike, arbitration and union security clauses, all valid at the time they were inserted. An employee was discharged for violation of the no-strike clause. The Adjustment Board provided for in the Agreement found against the employee. He then filed a charge of unfair labor practice with the National Labor Relations Board, which found in his favor and ordered his reinstatement. In the meantime the Union security clause had been held to be invalid. The Board held that this made the entire agreement "utterly null and void" (p. 76, 73 S.Ct. 519).

The Supreme Court reversed, holding that there were two obstacles in the way of the Board's complete disregard of the contract. First, that even "if inclusion of a forbidden provision is enough to justify the Board in setting it aside as to the future, it does not follow that it can be wholly ignored in judging events that occurred before it was set aside."

Second, the objectionable feature could be severed, particularly in view of the contract's separability clause. In dealing with this, the Court said in part:

> "The employment contract should not be taken out of the hands of the parties themselves merely because they have misunderstood the legal limits of their bargain, where the excess may be severed and separately condemned as it can here." (p. 79, 73 S.Ct. 524).

Substitute "license agreement" for "employment contract", and bearing in mind that misunderstanding "the legal limits of their bargain" required the overruling of a Supreme Court case directed expressly to that point, the above quotation is unusually apt.[78]

[9] Defendant has failed to prove misuse by plaintiff of the patent in suit, or of plaintiff's patent position.

INFRINGEMENT

The accused gear is found on six ships of the defendant Grace, of the Santa Lucia class. Five of the ships each have one 80-ton and one 30-ton gear. The sixth has two 80-ton gears.

The infringement problems from a comparison of the accused devices will separately be considered with respect to the 80-ton and the 30-ton gears. Consideration will also be given to the extent, if any, by which the structures of the accused gears have been influenced by knowledge or information of the gear covered by '390. Finally, the significance of Sun's and Grace's appraisal of the accused gear vis-a-vis the Sprengel gear will be considered.

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[78] Somewhat analogous is Compania De Inversiones Internacionales v. Industrial Mortgage Bank of Finland, 269 N.Y. 22, 198 N.E. 617, 100 A.L.R.A. 1313 (New York, 1935). Dollar bonds of a foreign corporation payable in this country in gold coin had been called for redemption. The Court held that unenforceability of the clause requiring payment in gold did not invalidate the bonds, but that the holder was entitled to payment in legal tender.

I. *Structure and Operation.*

1. The structure of the 80-ton gear is identical to that of the double pendulum gear of '390 with the following exceptions:

(a) In Sprengel's gear the purchase tackle is led by hauling tackle guide means extending "above the upper end of the boom" to the top of the kingposts, down through the kingposts and thence to the purchase winches.

In the accused structures, the purchase tackle is led from guide sheaves below the topping tackle and below the head of the boom to points near the upper ends of the kingposts and thence downward outside the cargo posts to the purchase winches.

Certain collateral advantages are (as expected) claimed with respect to whether the purchase tackle is led down through or outside of the kingposts. Advantages of having the purchase tackle go down through the kingposts are that the tackle is (largely) protected from sea water and that its emergence from the kingposts can be effected at any point, thus affording almost unlimited selection in the location of the winches on the deck or deck house; or the winches can be located entirely within the kingposts.

In favor of conducting the purchase tackle entirely outside the kingposts it is argued that the tackle is always visible and open for inspection; and that more conventional and cheaper guide blocks can be used.

Were the Court required to choose between these particular features, it would pick the Sprengel locations as more desirable. However, it is not necessary to choose, as the invention relates to the swing through, and not to the disposition of the purchase tackle after it leaves the boom.

Although the claims in suit refer to purchase tackle guide means extending "above the upper end of the boom", it was not, as defendant urges, necessary that this be inserted in the patent application as a limitation in order to secure the issuance of the patent. This is not a case in which claims were rejected because they called for purchase tackle guide means extending below the upper end of the boom, or for failure to specify their location. The claims were granted as originally filed, and there is no file wrapper estoppel.

Nor would the location of the purchase guide means above the upper end of the boom have been of itself a patentable element or ground of distinction. This was already employed in the Fork-type gear of Sprengel.

The Newport News and Lehmann designs had the cargo hauling (purchase) rope running underneath the topping tackle (PX 26, 32, 34).

It was well-known before 1964 that the cargo hauling parts could be satisfactorily installed either above or below a split topping lift.[79]

The testimony on behalf of plaintiff was that guiding the hauling parts below the topping lift accomplishes the same result and functions in the same way as if placed above. It is simply a matter of the designer's choice.[80]

That the "above" or "below" location is not critical is impressively manifested. As a result of conflicts as to whether or not heavy lift gear for the Grace ships had been agreed upon, and if so, what it was, a conference was arranged for March 17, 1965, between Sun, Grace, and

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[79] Bebler, PX 123, p. 80.

[80] Sprengel, Tr. 762, 765, 775, 781-2; Bebler, PX 123, pp. 78-80. This "choice" however, is restricted as to '390 to the double pendulum gear.

Gibbs & Cox, Grace's naval architects. Menko[81] of Gibbs & Cox prepared for and distributed at the meeting a detailed comparison, with comments, of the features of heavy lift cargo gear according to the designs of Sperg, the Fork-type gear, and Sprengel's pendulum block invention. The columnar comparison (PX 69B) lists the various elements of heavy lift gear, with a commentary regarding the differences between them. Nowhere is there any mention of, or comment with respect to, where the lead lines of the cargo hoist were with respect to the toppings—above or below; or as to where they must, or preferably (if there be a preference) should be.[82]

Defendant argues that:

> "Not only is defendant's guide structure different mechanically and in its operation, but . . . this was recognized by the Patent Office when it granted the Sperg patent (PX 68)"[83]

Defendant then refers to and quotes from an argument made on behalf of Sperg, pointing out that in his application the hauling parts lie below the topping lift, and do not go into the kingposts.

In this connection it must be remembered:

(i) Defendant's counsel admits that the Sperg patent should not have been granted.[84]

(ii) Whether or not arguments made in the course of the prosecution of a patent are admissible[85] their relevance here is not obvious. The Sperg patent has never been used!

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[81] Employed by Gibbs & Cox in its hull outfitting division, and in charge of that division since about 1958.

Gibbs & Cox was a well-known firm of Naval Architects, acting for Grace.

[82] Menko, PX 125, pp. 223-24; 329.

[83] Defendant's Brief after trial, p. 29.

[84] Tr. 196.

[85] Denominational Envelope Co. v. Duplex Envelope Co., 80 F.2d 186, 192-193 (4 Cir. 1935).

(b) In Sprengel's rig (Fig. 6 of '390) the purchase tackle hauling parts are guided by a sheave mounted on a turning head which rotates only on a substantially vertical axis. The purchase tackle then passes through an opening up to and across the equalizing sheave.

Defendant employs a universally mounted fair lead[86] for each part of the purchase tackle.

(c) Although the claims do not so require, the pendulum blocks of '390 are independently mounted in practice.

In the Sun rig, the pendulum blocks are joined together in a "cradle" and cannot move independently. Again, each side claims virtues. Defendant claims its rig is simpler and cheaper.[87] Plaintiff claims that defendant's rig is dangerous.[88]

Merging two elements into one unitary structure would not avoid infringement. Specialty Equipment & Machinery Corp. v. Zell Motor Car Co., 193 F.2d 515, 518 (4 Cir. 1952); imperfect practice of an invention is still infringement. Admiral Corporation v. Zenith Radio Corporation, 296 F.2d 708, 717 (10 Cir. 1961); and an improvement may still infringe. Acme Steel Company v. Eastern Venetian Blind Co., 130 F. Supp. 459, 466 (D.Md.1955); aff'd 227 F.2d 914 (4 Cir. 1955).

[10] In this Court's opinion the 80-ton gear of the defendant, although differing in some physical aspects from that of patent '390 is its equivalent since it "performs substantially the same function in substantially the same way to obtain the same result." Sanitary Refrigera-

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[86] Guide.

[87] Tr. 2281.

[88] Tr. 363-7.

tor Co. v. Winters, 280 U.S. 30, 42, 50 S.Ct. 9, 13, 74 L.Ed. 147 (1929). The Court continued:

> "... Authorities concur that the substantial equivalent of a thing, in the sense of the patent law, is the same as the thing itself; so that if two devices do the same work in substantially the same way, and accomplish substantially the same result, they are the same, even though they differ in name, form, or shape".

Accord, Wine Ry. Appliance Co. v. Baltimore & O. R. Co., 78 F.2d 312, 318-319 (4th Cir. 1935).

In perhaps the most frequently quoted expression of the doctrine, in Graver Tank & Manufacturing Co. v. Linde Air Products Co., 339 U.S. 605, 70 S.Ct. 854, 94 L.Ed. 1097 (1950), the Supreme Court stated:

> "In determining whether an accused device or composition infringes a valid patent, resort must be had in the first instance to the words of the claim. If accused matter falls clearly within the claim, infrigement is made out and that is the end of it.
>
> "But courts have also recognized that to permit imitation of a patented invention which does not copy every literal detail would be to convert the protection of the patent grant into a hollow and useless thing. Such a limitation would leave room for—indeed encourage—the unscrupulous copyist to make unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the claim, and hence outside the reach of law. One who seeks to pirate an invention, like one who seeks to pirate a copyrighted book or play, may be expected to introduce minor variations to conceal and shelter the piracy. Outright and forthright dupli-

cation is a dull and very rare type of infringement. To prohibit no other would place the inventor at the mercy of verbalism and would be subordinating substance to form.

• • •

"In determining equivalants, things equal to the same thing may not be equal to each other and, by the same token, things for most purposes different may sometimes be equivalents. Consideration must be given to the purpose for which an ingredient is used in a patent, the qualities it has when combined with the other ingredients, and the function which it is intended to perform. An important factor is whether persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in the patent with one that was.

"A finding of equivalence is a determination of fact. Proof can be made in any form: through testimony of experts or others versed in the technology; by documents, including texts and treatises; and, of course, by the disclosures of the prior art.

"Like any other issue of fact, final determination requires a balancing of credibility, persuasiveness and weight of evidence. It is to be decided by the trial court and that court's decision, under general principles of appellate review, should not be disturbed unless clearly erroneous. Particularly is this so in a field where so much depends upon familiarity with specific scientific problems and principles not usually contained in the general storehouse of knowledge and experience." (Id. 607, 609-610, 70 S.Ct. 855).

Accord, Specialty Equipment & Mach. Corp. v. Zell Motor Car Co., 193 F.2d 515, 518-520 (4th Cir. 1952);

Marvel Specialty Co. Inc. v. Bell Hosiery Mills Inc., 330 F.2d 164, 174-177 (4 Cir. 1964), cert. denied, 379 U.S. 899, 85 S.Ct. 187, 13 L.Ed.2d 175; and Waterproof Insulation Corp. v. Insulating Concrete Corp., 153 F.Supp. 626 (D.Md. 1957).

[11] A device infringes where the substance of an inventor's contribution has been appropriated even if practiced imperfectly. Matthews v. Allen, 182 F.2d 824, 827-828 (4th Cir. 1950); Baker Manufacturing Co. v. Whitewater Manufacturing Co., 298 F.Supp. 1389, 1397 (E.D. Wis. 1969); and Admiral Corp. v. Zenith Radio Corp., 296 F.2d 708, 717 (10th Cir. 1961).

[12] The combination into a single physical member of two elements called for by a patent claim does not avoid infringement if the single member performs in substantially the same way the same functions as the two, nor does the separation of one member into two, if the two perform substantially the same function as the one. Specialty Equipment & Mach. Corp. v. Zell Motor Car Co., *supra* at 518; Skelton v. Baldwin Tool Works, 58 F.2d 221, 227 (4th Cir. 1935); Royal Typewriter Co. v. Remington Rand, 168 F.2d 691, 693 (2nd Cir. 1948), cert. denied, 335 U.S. 825, 69 S.Ct. 50, 93 L.Ed. 379; Borg-Warner Corp. v. Mall Tool Co., 217 F.2d 850, 853 (7th Cir. 1954), cert. denied 349 U.S. 946, 75 S.Ct. 875, 99 L.Ed. 1272; and Zysset v. Popeil Brothers Inc., 276 F.2d 354 (7th Cir. 1960), cert. denied, 364 U.S. 826, 81 S.Ct. 62, 5 L.Ed.2d 54.

2. Sun's 30-ton gear.

In addition to the variations from '390 with respect to Sun's 80-ton gear, mentioned above and found not to avoid equivalence, Sun's 30-ton gear has another, and very significant difference.

Appendix B

Each of the claims of '390 in suit calls for a, or a pair of, purchase blocks fittings, each fitted and adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it. Sun's 30-ton tackle (PX 63) has no upper purchase blocks. Plaintiff argues that the "function" of the upper cargo blocks is served by the cross-over sheave and the guide sheaves. Defendant counters, with far greater persuasiveness, that the cross-over and guide sheaves do not perform the function of the omitted purchase block(s) called for by the claims. The cross-over and guide sheaves provide for four parts (of wire) running to the lower purchase blocks of the 30-ton rig. The parties are in agreement that this gives a mechanical advantage of 4:1. This is insufficient for the heavy loads for which the Sprengel gear is designed; the upper purchase block(s) add additional parts in the tackle leading to the power purchase blocks, and hence an increase of mechanical advantage.

Plaintiff does not argue that sheaves can simply be added to the guide blocks and/or the equalizing sheave of the 30-ton gear.

[13] Defendant's 30-ton rig without upper purchase blocks is not the equivalent of the rig of '390, and cannot perform the heavy lift function of the '390 rig.

II. *Defendant's Knowledge or Information as to Sprengel Design.*

As submitted for bids in early 1963, the specifications for the Santa Lucia class ships called for heavy lift gear of the Stulcken fork-type.[89] Sun was the low bidder, and as early as June 1963, Sun indicated its desire to substitute some other gear.[90]

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[89] Menko, PX 125, pp. 28-31; PX 132, par. 1.

[90] PX 136, par. 4e.

Appendix B

Sun proposed the substitution of Wiley-Lehmann gear in March 1964, but Grace rejected it for "operational and technical reasons" (PX 137A-C).

On June 25, 1964, Sperg first made a sketch for Sun of his proposed design for heavy lift gear (PX 92) which did not have a cross-over sheave (Tr. 1792 ff). On July 27, 1964 Sperg prepared a drawing of his proposed gear for Sun's patent attorney.[91] This showed gear having the upper purchase block sheaves affixed to the end of the boom, a cross-over sheave permanently affixed in a plane perpendicular to the boom's longitudinal axis, and the use of non-articulating "ears" for the shackles connecting the topping lift tackle to the end of the boom. These features appear in the patent drawings (PX 68) and in all of Sun's submissions to Grace and Gibbs & Cox until May 1965.

Sometime in the latter part of 1964, Captain Mohan[92] visited MacGregor's offices and inspected the single pendulum-block model,[93] conceived by Sprengel in September 1963. In September 1964 Atkinson, President of Sun, was shown pictures of models embodying both the single and double pendulum block designs.[94]

Gibbs & Cox expressly rejected Sperg's design in a letter dated October 29, 1964, in which numerous alleged deficiencies were enumerated.[95]

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[91] PX 90E, DX 52; Sperg, Tr. 1809-12.

[92] After thirty years as an officer in the United States Navy, Captain Mohan was employed by Grace in 1963 as its Assistant Technical Director, and at the end of 1964 or beginning of 1965 he became Technical Director. He "took over the responsibility for coordinating the efforts of the building of the Santa Lucia ships" (PX 124, pp. 3-10, 89).

[93] PX 44A-C; Klewsaat, Tr. 1668, 1680-82; Mohan, PX 124, pp. 90-91, 135-36.

[94] PX 76F, 76G and 84; DX 80, pp. 35-42; Tr. 1669-73.

[95] PX 90, pars. 3, 4, 8 and 9; PX 125, pp. 99-120.

Gibbs & Cox requested that Sun furnish design data regarding the "comparable Stulcken rig" for comparative evaluation, but Sun refused, ostensibly because it did not agree with the criticisms of Gibbs & Cox.[96]

Thereafter Sun on several occasions submitted detailed drawings for the 80-ton and 30-ton gears.[97]

As a result of the failure of Gibbs & Cox to approve any of the Sperg drawings, the March 17, 1965 conference previously described, was held at which the Sperg, Fork and new Stulcken rigs were compared (PX 69 & PX 69B).

Sperg and other Sun draftsmen were then instructed to design boom head fittings which did not have the fixed upper purchase block sheaves which had been criticized by Gibbs & Cox. (Sperg, Tr. 1980-82).

On April 22, 1965, Klewsaat and Korthaus of MacGregor exhibited to Sun personnel, including Zeien, Sun's Vice President of Engineering; Brawner, his assistant; Pavlik, Sun's Chief Naval Architect; Wilkie, Sun's Chief Draftsman of Sun's entire hull drafting department; and five others, a model of Sprengel's gear; still pictures of the single and double pendulum-block type gear, and motion pictures of the M. S. Westphalia; and the differences between the fork-type and pendulum block gear were explained.[98]

Finally, by drawings dated May 12, 1965 and June 22, 1965,[99] Sun's detailed engineering drawings for the boom and boom head fittings for the 80-ton and 30-ton rigs were established in form actually installed on Grace's Santa Lucia line ships.

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[96] PX 90, par. 11; PX 125, pp. 125, 141-6; PX 127, pp. 80-82; PX 125, pp. 140-146.

[97] PX 97A, 97C; PX 98A, 98C; PX 73A-C, drawings FF and JJ, dated February 11, 1965; PX 73F.

[98] PX 44A-C; PX 76A-H; PX 77A-G; PX 42; PX 87; Tr. 1682-86, 2714; PX 130, p. 25; DX 80, pp. 42-48.

[99] PX 55 and 57. Remarkably, they are also known as drawings FF and JJ, although they bear no resemblance to the similarly lettered drawings forwarded by Sun on February 11, 1965.

[14] Sun's efforts to use gear other than the specified Stulcken fork; Sun's unsuccessful efforts to have the gear shown in the Sperg patent approved; and the modification to a pendulum type gear after exposure to Sprengel's development, all lead to the conclusion, which the Court draws, that the 80-ton gear in fact installed was based upon knowledge of the Sprengel pendulum gear structures.

III. *Sun and Grace's Appraisal of the Sprengel Gear and the Accused Gear.*

1. Pechtel, employed by Sun as a Naval Architect, prepared Sun's instruction manual (PX 150) for the operation of the heavy lift gear installed on Grace's Santa Lucia Line ships. In this manual (PX 150, January 1966) he copied extensively, pictorially and textually (but without quotation marks or acknowledgement) from the text of and illustrations in plaintiff's brochure (PX 23) entitled "The Stulcken Mast—Over a Dec*k*ade of Progress." He admitted using PX 23. (PX 129, p. 9). He characterized Sun's gear as having "one pendulum block fitting . . . on each side of the boom head". (PX 150, p. 7).

There could be no clearer form of recognition that the Sprengel and the Sun 80-ton rigs "perform substantially the same function in substantially the same way to obtain the same result." (Sanitary Refrigeration Co. v. Winters, 280 U.S. 30, 42, 50 S.Ct. 9, 13, 74 L.Ed. 147 (1929)).

2. On December 2, 1965, Captain Mohan wrote to Grace's President, in part as follows:

> "On page 7 [of PX 23] is a Stulcken type almost exactly like ours. In some case[s] the Stulcken has

> one cargo block offset on the boom to permit swinging through without splitting the block. This requires a boom which is stiffened to make up for the torque introduced by the offset block. Stulcken has standardized on a split block—just like ours. *Sun fears a law suit by* Stulcken *since both systems are practically identical. I think Sun got there first''.* (PX 131; emphasis added)

Defendant seeks to weaken this damaging admission that the Stulcken and Sun "systems are practically identical" by suggesting:[100]

(a) That Captain Mohan, although Technical Director with "the responsibility for coordinating the efforts of the building of the Santa Lucia ships" (PX 124, p. 89) was not "knowledgeable".

No repudiation is of record by Grace of either the propriety of the comparison or of Captain Mohan's capacity.

(b) That Captain Mohan was comparing the Sperg patent apparatus with that of Sprengel.

It is incredible that Captain Mohan did not know in December of 1965, that the Sperg patent apparatus was not being installed, and was not going to be installed on the Grace lines ships, in view of its repeated non-acceptance by Gibbs & Cox, and the filing on May 12, 1965, of the superseding plans for the gear actually installed (PX 55, also known as GG).

We thus have unqualified recognition, both by Grace and Sun, of the similarity, even the practical identity, of the two rigs.

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[100] Defendant's Brief on Infringement, p. 55.

Appendix B

CONCLUSION

1. The Court has jurisdiction of the subject matter of this suit, and over the parties.

2. The patent in suit, No. 3,236,390, and claims 1, 2, 3, 14, 15 and 18 thereof are valid.

3. The 80-ton gear installed on the Grace Line Santa Lucia class ships infringes claims 14, 15 and 18 of Patent 3,236,390.

4. The 30-ton gear installed on the Grace Line Santa Lucia class ships does not infringe any of the claims in suit.

5. Plaintiff is not barred from enforcing the patent by misuse of the patent, or of plaintiff's patent position.[101]

6. Defendant's counterclaims are dismissed.

7. If the parties are unable to agree upon damages, they are to be assessed through further proceedings.

The foregoing represents the Court's findings of fact and conclusions of law, under F.R.Civ.P. 52(a).

An appropriate decree may be submitted within fifteen days.

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[101] Defendant has raised a unique, even weird, defense of estoppel, apparently on the ground that plaintiff should have amended its patent application before issuance, or applied for a reissue, to insert claims that would read verbatim on the accused structures. No authority is cited to support this contention, and the Court is aware of none. Moreover, until the ships were delivered, plaintiff could not be certain of exactly what the gear would be; and some changes were made in the gear after installation (PX 124 p. 178).

APPENDIX C

The judgment of the United States Court of Appeals for the Fourth Circuit

(PHOTOSTAT)

(See opposite ☞)

APPENDIX C

nt of the United States Court of Appeals for the Fourth Circuit

(PHOTOSTAT)

(See opposite ☛)

True Copy, T e

lliam K. Slate

Deputy C

JUDGMENT

# United States Court of Appeals
for the
Fourth Circuit

No. 73-1058

Blohm & Voss AG,

Appellee,

vs.

Prudential-Grace Lines, Inc.,

Appellant.

Appeal from *the United States District Court for the* ----------

District of Maryland.

This cause *came on to be heard on the record from the United States District Court for the* ------------- *District of* Maryland *, and was argued by counsel.*

On consideration whereof, *It is now here ordered and adjudged by this Court that the judgment of the said District Court appealed from, in this cause, be, and the same is hereby,* reversed.

FILED
DEC 6 1973
WILLIAM K. SLATE, II
CLERK

William K. Slate II
CLERK

st:
II, Clerk
erk

APPENDIX D

The Order by the United States Court of Appeals for the Fourth Circuit denying Blohm & Voss' petition for rehearing

UNITED STATES COURT OF APPEALS

FOR THE FOURTH CIRCUIT

No. 73-1058

BLOHM & VOSS AG,
Plaintiff-Appellee,
v.
PRUDENTIAL-GRACE LINES, INC.,
Defendant-Appellant.

ORDER

Upon the suggestion for rehearing en banc and the request for a vote upon such suggestion, a majority of the judges qualified to vote having voted against rehearing en banc; and,

Upon consideration of the petition for rehearing, a majority of the judges on the panel having voted against rehearing;

It is accordingly ADJUDGED and ORDERED that the petition for rehearing shall be, and the same hereby is, denied.

A True Copy, Teste:
WILLIAM K. SLATE, II, Clerk

By (Signature Illegible)
....
Deputy Clerk

ALBERT V. BRYAN
For the Court

APPENDIX E

Constitutional and Statutory Provisions and Rules Involved

The Fifth Amendment of the Constitution of the United States reads as follows:

PROVISIONS CONCERNING PROSECUTION, TRIAL AND PUNISHMENT.—PRIVATE PROPERTY NOT TO BE TAKEN FOR PUBLIC USE, WITHOUT COMPENSATION.

No person shall be held to answer for a capital or other infamous crime unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the militia, when in actual service, in time of war or public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

* * *

Title 35 of the United States Code provides in pertinent part:

> § 103. A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

* * *

Appendix E

Rule 52(a) of the Federal Rules of Civil Procedure reads:

FINDINGS BY THE COURT

(a) *Effect.* In all actions tried upon the facts without a jury or with an advisory jury, the court shall find the facts specially and state separately its conclusions of law thereon, and judgment shall be entered pursuant to Rule 58; and in granting or refusing interlocutory injunctions the court shall similarly set forth the findings of fact and conclusions of law which constitute the grounds of its action. Requests for findings are not necessary for purposes of review. Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses. The findings of a master, to the extent that the court adopts them, shall be considered as the findings of the court. If an opinion or memorandum of decision is filed, it will be sufficient if the findings of fact and conclusions of law appear therein. Findings of fact and conclusions of law are unnecessary on decisions of motions under Rules 12 or 56 or any other motion except as provided in Rule 41(b).

Appendix F

Letter from Chief Judge Clement F. Haynsworth, Jr. Dated January 21, 1974

United States Court of Appeals
Fourth Judicial Circuit

January 21, 1974

CHAMBERS OF
CLEMENT F. HAYNSWORTH, JR.
CHIEF JUDGE
GREENVILLE, SOUTH CAROLINA 29603

J. Cookman, Jr., Esquire
301 North Charles Street
Baltimore, Maryland 21201

Carlisle Roberts, Esquire
Barringer Building
Columbia, South Carolina

No. 73-1058, Blohm & Voss AG v.
Prudential-Grace Lines, Inc.

Gentlemen:

I submitted the matter which you raised with me to the Judicial Conference of the Fourth Circuit, with the exception of Judge Widener. Each was sent a copy of Mr. Toren's statement, and I reported to them additional information I received, which is summarized as follows:

Upon inquiry of Judge Widener, he informed me that he had not gone to Norfolk, and that he had not talked to anyone in the United States Navy about this case. With his law clerk, Phil Gardner, he drove on the morning of May 23, 1973, from Richmond, Virginia, to Newport News, and there visited the Maritime [sic] Museum. They spent a little while looking at ship models and several hours searching for and reading articles found principally in periodicals in the public library maintained in the museum. Photo copies were made and retained of some of the articles Judge Widener read there.

Appendix F

Upon leaving the museum, the two drove back to Richmond, and from there they drove to Alexandria, Virginia, where they spent the night at the Marriott Motel in Crystal City. The next morning Judge Widener participated in a conference on this case with Judge Bryan and Judge Winter in Judge Bryan's chambers in Alexandria. After the conference was concluded Judge Widener and his law clerk traveled to Abingdon.

Judge Widener fixed the date of his visit to the museum at Newport News as May 23 and his conference with Judges Bryan and Winter as May 24, by reference to the file copy of his travel voucher.

Mr. Phillip G. Gardner, one of Judge Widener's law clerks in May 1973, is now an associate in the firm of Frith & Gardner, 54 West Church Street, Martinsville, Virginia 24112. Contacted there, and told of the essence of Mr. Toren's statement, Mr. Gardner told me what occurred on May 23 and 24, 1973, his version confirming in all its essential details the statement I had previously obtained from Judge Widener. The only differences were that Mr. Gardner referred to the museum as the Mariners Museum (which appears to be the correct name) and he was unable to say just when it was that he had gone with Judge Widener to Newport News and Alexandria, though he thought it was sometime in May 1973.

I contacted Judge Winter, who told me that he went to Alexandria, Virginia, on May 24, 1973 (the precise date was fixed by reference to his diary) for a conference with Judges Bryan and Widener about this case. He said that Judge Widener told Judge Bryan and him of his visit the preceding day to the Mariners Museum, and he distinctly recalls Judge Widener's showing them photo copies of some articles he had read during his visit to the museum on May 23.

Judge Bryan recalled the conference and reported that Judge Widener during the conference told Judge Winter and him of Judge Widener's visit the preceding day to the Mariners Museum in Newport News. Judge Bryan showed familiarity with the museum and library there. He said he did not now recall Judge Widener displaying to him and Judge Winter any photo copies of articles which Judge Widener had read the day before; he had a faint recollection of some photo copies being produced by Judge Widener but thought they were pictures of ships' gear. He was clear, however, in his recollection of Judge Widener telling him and Judge Winter of the visit to the library in the Mariners Museum.

On the basis of this submission, the Judicial Council of the Fourth Circuit, Judge Widener not participating, found unanimously that Judge Widener did not discuss this case with any person, or persons, in the employ of the United States Navy. It is unanimously of the opinion that there was no impropriety in Judge Widener's going to a public library and there reading and copying articles in the public domain, two of which are cited in the slip opinion at pages 21 and 22. The Council found in what transpired no procedural unfairness to any litigant in this case and concluded that no further action by it is appropriate.

Under the circumstances, I contemplate no further action.

In accordance with my earlier statement to you, the Clerk entered an order granting an indefinite extension of time within which a petition for rehearing might be filed. The period of that extension should now be made definite. For that purpose, I would suggest that counsel for Blohm & Voss contact Mr. Slate.

This letter is being addressed to you as the Fourth Circuit associates of the principal counsel for the parties. I am sending copies to Mr. Harkins in Philadelphia and

Mr. Carr in New York. I will appreciate your informing any other of your associates who should have knowledge of it.

Sincerely,

cc: Judicial Council of the Fourth Circuit

Honorable Albert V. Bryan
United States Circuit Judge
Alexandria, Virginia 22313

Francis T. Carr, Esquire
Kenyon & Kenyon Reilly Carr & Chapin
59 Maiden Lane
New York, N. Y. 10038

John G. Harkins, Jr., Esquire
2001 Fidelity Building
Philadelphia, Pennsylvania 19109

APPENDIX G

Blohm & Voss' Petition for Rehearing

Plaintiff-Appellee's Petition for Rehearing

To the Honorable Judges Bryan, Winter and Widener of the United States Court of Appeals for the Fourth Circuit:

Plaintiff-appellee Blohm & Voss hereby petitions for a re-hearing of the above-entitled appeal and respectfully suggests that the re-hearing be *en banc,* pursuant to Rules 40 and 35, F.R.A.P., respectively.

Basis of the Petition

The majority misapprehended proper appellate procedure under Rule 52(a), F.R.C.P.,

(a) by disregarding the findings of the Trial Court and adopting findings resulting from its own *de novo* factual inquiry, including consulting prior art references not in the record; and

(b) by relying on its own interpretation of technical facts and overlooking that of counsel, the experts at trial, and the Trial Court, and in so doing, making serious technical errors in reaching its decision.

ARGUMENT

The Majority Misapprehended Its Role in Appellate Review.

The majority opinion was rendered December 6, 1973 by Judge Widener joined by Judge Bryan, with Judge Winter dissenting. The sole issue considered by the majority was the issue of validity of U.S. Letters Patent No. 3,236,390 on the ground of obviousness over the prior art, 35 U.S.C. § 103.*

As indicated by the dissent, at Op. 53-55,** the majority clearly misapprehended its appellate role by undertaking its own *de novo* factual inquiry as if it were a trial court, in disregard of the established procedures of appellate review, Rule 52(a), F.R.C.P. As a consequence, plaintiff has been denied the benefit of the established standard of appellate review and thus has been denied due process.

One of the maladies resulting from the improper standard of appellate review adopted by the majority was aptly highlighted by Judge Winter:

> "But in the field of patent law, where our experience teaches us that the professional patent bar generally is in possession of more expertise than the average judge who is called upon to decide a patent case, I am loath to decide a case on the basis of contentions not advanced by counsel without, at least, inviting the comments of counsel on what may seem to us to be determinative considerations not advanced in presentation of the appeal." (Op. 54-55)

As pointed out by Judge Winter, and as a review of the majority opinion amply demonstrates, the majority evidently felt itself to be as, or more, technically qualified than patent counsel since it based its decision on prior art not urged by appellant in this court, hence not briefied or argued; and it considered itself to be as, or more, technically qualified than the experts who testified at trial, since it interpreted thé prior art without any reference to such expert testimony, of which there was a veritable mountain. The majority simply grasped five pieces of prior art* (in addition to four references not of record), put its own untutored interpretation upon them and reversed the finding of validity below based on that interpretation.

---

* Judge Winter's dissent deemed the remaining issues urged by appellant to be without merit. Op. 64.

** Op. refers to pages of the slip opinion.

In effect, the majority has granted the defendant a summary judgment of invalidity based upon obviousness in view of a combination of prior art references "generally, with a startling lack of specificity of precisely what in the prior art made the Sprengel invention obvious" (Op. 53-4) However, here, unlike summary judgment procedure, the majority has not even had the benefit of counsel's argument concerning the art it considered, except for Lehmann '222.

Can there be any question in the mind of any member of this Court, that had defendant made a motion for summary judgment in the court below, it would have been denied for the reason that there were genuine issues of material fact presented to be determined by that court, and because the *trier of fact,* the District Court judge, should have had the benefit of expert technical assistance in deciding those issues. Indeed, the procedure adopted by the majority, in usurping the function of the District Court makes a mockery of our established system of appellate review.

The fact that the majority relied upon prior art references outside the Record makes such procedure doubly disturbing because plaintiff has no way of knowing to what extent the majority was influenced thereby, as well as having had no opportunity to present argument with respect thereto.

Plaintiff submits that the only reason such an unorthodox form of appellate procedure was here adopted was that, distinct from the usual patent appeal, one member of the panel, because of his particular educational background and perhaps experience, may have considered himself to be technically qualified to judge this subject matter unaided.

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* Only one of which was urged by defendant.

In Its *De Novo* Review, the Majority Failed to Understand the Technology.

It is one thing for an appellate court to substitute its supposed technical judgment for that of the District Court, made in the light of extensive expert assistance. However, it is quite another thing to misapprehend the technical facts and thereby substitute misjudgment.* This the majority has done.

Rotary Gear Patents

The majority likens the Sparrow '403 and Lehmann '790 patents to that of the gear in suit, and states that they operate in the same way (Op. 34, 40, 41). This is simply contrary to fact. Although the booms of these references are designed to serve fore and aft, neither has a purchase block fitting mounted by the head of the boom to permit the purchase tackle to swing pendulum-like in use and as the boom swings-through the kingposts, as called for by the patent in suit.

---

* The majority even misapprehended the issues which were decided below. The majority stated that the District Court found claims 1, 2 and 3 were not infringed, by implication, by defendant's 80-ton gear (Op. 34). There was no such holding; the District Court's opinion is completely silent on the subject.

Further, defendant's 30-ton gear is not, as stated the majority (Op. 34, fn. 13), a single pendulum-type gear, but a double-pendulum type. It was held not to infringe for reasons entirely apart from whether single or double.

Appendix G

The majority inaccurately concluded:

> "Sparrow also discloses purchase gear which swings alongside the boom as the boom swings through the vertical, like a pendulum. The sleeve at the boom head may be rotary, but the drawings and the claims clearly disclose purchase gear which swings alongside the boom as the boom swings through the kingposts." (Op. 34)

The Sparrow '403 patent does not state or suggest that the purchase tackle swings-through like a pendulum, contrary to Op. 34. The patent (col. 5, lines 29-45), including its drawings, clearly shows that the purchase tackle is suspended for free movement from a *rotatable collar* mounted on the top of the boom. When it is desired to swing the boom through, the hook, hence the purchase tackle, is attached to a winch on the other side of the boom, and the winch pulls on the purchase tackle, *causing the collar to rotate 180°*, at which point the boom is pulled out of vertical for use at opposite hatches. At *no* time in the swing-through operation does the purchase tackle swing like a pendulum; it is *always* fixed in position by the winch. In lay language, the purchase tackle is pulled around in the same manner as a ribbon on a Maypole. There is simply *no pendulum* movement of the purchase tackle in swinging the boom through.

The operation of Sparrow, including the swing-through operation, was fully explained (without contradiction) by Sprengel at the trial (R 396a *et seq.* and particularly R 404a). There is not a scintilla of doubt that the purchase tackle is and must be *rotated about* the boom to effect swing-through, and that the purchase tackle does *not* swing pendulum-like in that operation. The majority is clearly wrong.

Appendix G

As to Lehmann '790, the majority, probably relying upon a misinterpretation of a passage in that patent (quoted at Op. 30-31), stated:

> "... in Lehmann '790 ... when the boom is swung forward to aft, the purchase gear swings through alongside the boom like a pendulum." (Op. 40)

The '790 patent teaches the contrary.

That patent states (PX 34, col. 4, ls. 11 *ff*)* that the boom is turned, i.e., *rotated during* the swing-through movement of the boom. The shackles from which the purchase tackle is suspended are fixedly attached to the top of the boom. The purchase tackle (and also the shackles) necessarily goes around the boom in an arc in the course of this movement and is *at* the side of the boom only momentarily when the boom is at absolute vertical; by no stretch of the imagination can it be said that the purchase tackle swings pendulum-like by the side of the boom in or out of the swing-through position.

Again, the Record also fully contradicts the majority's understanding of Lehmann '790; see the uncontradicted expert explanation of the operation of Lehmann's gear (R 474a *ff*., especially R 481a-484a).

Thus, it may easily be seen that both Sparrow '403 and Lehmann '790 sought a solution to the same problem—a swing-through boom—and both reached essentially the same inferior solution—rotation of the boom itself or rotation of a collar on the boom. In neither does the purchase tackle swing alongside the boom either in use or in swinging-through. Lehmann '790 was a file reference against the patent in suit, over which there is a presumption of validity. How can the addition of a like reference (Sparrow) affect that presumption? (See Op. 44)

---

* If this Court will consider the noted passage in '790, it will be readily apparent why the trier of fact has need of expert technical assistance.

The Gallows Rig Patent

The Lehmann '222 patent was so dubbed because it resembles a gallows, two boom-legs attached at the top by a fixed cross-piece with the lifting gear suspended therefrom. The whole structure is mounted on a rotatable platform.

The majority stated:

> "The finding of the district court that Lehmann '222 taught a boom which rotates on a 180 degree axis to *face* one hatch and then *turn* to face the other hatch was clearly erroneous." (Op. 28; emphasis in original)

We simply have not been able to locate any such finding in the opinion of the Court below. It would seem that the majority adopted the erroneous position espoused by defendant without carefully checking the opinion itself. We urge this Court to reconsider our treatment of this question in Appellee's Brief, pages 20-21.

It should be appreciated by this Court that Judge Watkins had models of the gear before him, he saw them demonstrated by the experts and he heard very extensive expert testimony on its operation, and the serious problems to be encountered in trying to construct and operate such gear (e.g., R 489a-495a; R 2093a-2667a, esp. 2093a-2148a). His opinion should be reviewed in this light.

Even assuming, without accepting, the view of the majority as expressed above, such a finding of a single error is hardly sufficient to warrant a total disregard of the many other findings by the District Court supporting its holding of non-obviousness.

The Boat Davit Patent

The majority seems to have been much taken with Ashe '664, directed to boat davits (Op. 22 *ff*). In effect, it criticized the District Court for giving this reference little or on weight; however, defendant obviously thought no more of it and did not rely on it at all here.

The majority stated in this regard:

> "To the extent that such analysis [by the District Court] was based on the *assumption* that davits do not raise, lower and transfer, it was clearly erroneous." (Op. 24; emphasis added)

Apparently, the majority did not carefully read the opinion below, because the foregoing is a total misapprehension of what the District Court said, to wit:

> "Davits may loosely be considered as 'devices in the nature of booms or cranes from which a life craft is lowered by means of cables, or other added lowering means, to the water.' *
>
> Note the emphasis on *'lowering'*. A cargo boom must, however, lower, raise, and transfer.
>
> Sprengel would not characterize Ashe's davit arm as a boom; a cargo boom must not only move up and down, but to port and starboard.
>
> Bebler felt that Ashe's davit had no bearing on the invention in suit. It was designed for special purposes not applicable to heavy lift cargo gear." ** (346 F.Supp. at 1125; emphasis in original; footnotes added; original footnotes omitted)

What this clearly reflects is a full appreciation by the District Court that a single boat davit cannot be considered a boom because *it can not slew, i.e.,* it can move in only one plane and cannot be used to *transfer* cargo or boats to or from *port or starboard* dock locations and into various holds of a ship.

---

* While the majority criticized this definition of "davit", it is the definition urged upon the District Court by defendant in DX 67.

** Even defendant's expert admitted that Ashe '664 was "primarily related to lowering" (346 F. Supp. 1125). The District Court's ability to determine the credibility of witnesses on this issue is surely entitled to great weight.

The belief that a boat davit had little relationship to the patented gear was not the product of the District Court's subjective judgment based on any personal experience of its own—it was squarely based upon the testimony of experts in the art who were before it.

It will be more than apparent from the foregoing discussion of specific patents, that the questions before this Court involve highly complex technical subject matter, which have not heretofore been briefed or argued herein. Plaintiff stands ready to provide a full briefing and/or argument if this Court so desires.

The Appellate Court Failed to Apply Established Standards of Appellate Review.

Rule 52(a), F.R.C.P., requires affirmance unless the findings are *clearly erroneous,* and states that due regard be given to the opportunity of the trial court to assess the credibility of witnesses. There can be no quarrel with this proposition of law; there should be none with respect to its application.

Many cases may be cited where the findings have been set aside as being clearly erroneous *in view of the evidence* adduced at trial. Violative of Rule 52(a) is the case where, as here, the District Court is reversed, *not* because the findings have been found to be clearly erroneous in view of the evidence presented, but because one or more members of the appellate court have concluded that had the factual questions been first presented to them, they would have reached a different conclusion. *United States* v. *Yellow Cab Co.,* 338 U.S. 338, 341-2 (1949); see the dissenting opinion of Justice Harlan in *United States* v. *Singer Mfg. Co.*, 374 U.S. 174, 201-2 (1963).

This Court of Appeals has in the past not practiced this type of appellate review. *B's Company, Inc.* v. *B. P. Barber & Associates, Inc.*, 391 F.2d 130, 132 (4th Cir. 1968); *Summers* v. *Watkins Motor Lines*, 323 F.2d 120, 122 (4th Cir. 1963). Nor have other Courts of Appeal, e.g., *Strickler* v. *Pfister Associated Growers, Inc.*, 319 F.2d 788, 790 (6th Cir. 1963); *United States* v. *Times-Mirror Co.*, 231 F.2d 876, 879 (9th Cir. 1956).

Here, as is more than apparent from a reading of the opinion, the majority ignored the factual evidence presented to the trial court (a 4500 page record); it likewise ignored the fact that the District Court's opinion was annotated in a most detailed way to the trial record, substantial evidentiary support being cited for virtually every finding. In only two instances did the majority conclude that the District Court made a clearly erroneous finding; as treated above, one such conclusion was drawn on the basis of an erroneous assumption of what the District Court understood (Op. 24), and the other (Op. 28), like a straw finding, was nonexistent, hence could not be erroneous.

This is hardly justification for reversal.

Justice Frankfurter long ago perceived the type of situation here presented, when in his dissent in *Marconi Wireless Telegraph Co.* v. *United States*, 320 U.S. 1, 63 (1943), he stated:

> "And yet, because a judge of unusual capacity for understanding scientific matters is able to demonstrate by a process of intricate ratiocination that anyone could have drawn precisely the inferences that Marconi drew and that Stone hinted at on paper, the Court finds that Marconi's patent was invalid although nobody except Marconi did in fact draw the right inferences that were embodied into a workable boon for mankind."

Appendix G

The dangers of the type of appellate review in which the majority has engaged are here much in evidence. Although apparently confident of its ability to make technical factual determinations without assistance, such confidence was misplaced. The majority has in fact erred in its *de novo* inquiry, as pointed out above. These errors are far more fundamental than anything for which the majority has criticized the District Court.

Such errors need not have been made, had the Record been fully consulted. Such errors would have been avoided completely if the majority had had the benefit of counsel's argument; however, since the majority based its conclusions on prior art and positions not asserted or taken by appellant, there was no opportunity for comment. Indeed, the majority reached out to at least four prior art references never before this or the District Court and totally unknown to plaintiff's counsel (and probably defendant's counsel, as well).

Judge Winter fully recognized that an improper procedure had been adopted by the majority, when he said:

> "My basic quarrel with the majority is its undertaking to act like a trial court, rather than an appellate court; and in so doing, to do violence to the accepted rules of appellate review. This is not a case where the district court's factual finding of non-obviousness is clearly erroneous. It is a case where the majority has undertaken a *de novo* factual inquiry into the claim of obviousness." (Op. 55)

Judge Winter was absolutely correct—the majority herein has not only proceeded contrary to established standards of appellate review, but in so doing, it has compounded the error by itself making incorrect determinations of technical fact which are fundamental to the basis for its reversal.

Plaintiff is entitled to a full re-hearing and to have the established standards of appellate review employed in that connection. Such relief is respectfully solicited.

Respectfully submitted,

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February 8, 1974

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Certificate of Service

Service of the foregoing "Petition for Rehearing" was made on defendant-appellant by mailing a copy thereof, first class postage prepaid on February 8, 1974, to each of Robert A. Shelton, Esq., Venable, Baetjer & Howard, 2 Hopkins Plaza, Baltimore, Maryland 21202; George J. Harding, 3rd, Esq., Smith, Harding, Earley and Follmer, 2100 Two Girard Plaza, Philadelphia, Pennsylvania 19102; and John G. Harkins, Jr., Esq., Pepper, Hamilton & Scheetz, 2001 The Fidelity Building, Philadelphia, Pennsylvania 19109.

....

APPENDIX H

The Patent in Suit No. 3,236,390

(PHOTOSTATS)

(See opposite ☞)

Feb. 22, 1966 **H. F. J. SPRENGEL** 3,236,390

SHIP'S CARGO BOOM WITH PENDULUM PURCHASE BLOCK FITTING

Filed Oct. 2, 1964 8 Sheets-Sheet 1

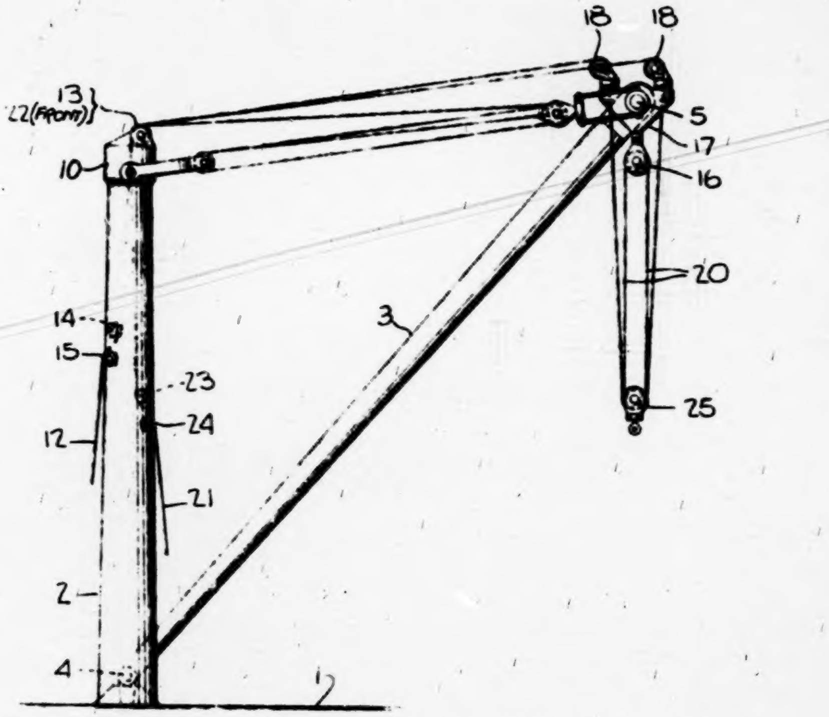
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Fig. 1.

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BY
Kenyon & Kenyon
ATTORNEYS

Feb. 22, 1966 **H. F. J. SPRENGEL** **3,236,390**

SHIP'S CARGO BOOM WITH PENDULUM PURCHASE BLOCK FITTING

Filed Oct. 2, 1964 8 Sheets-Sheet 2

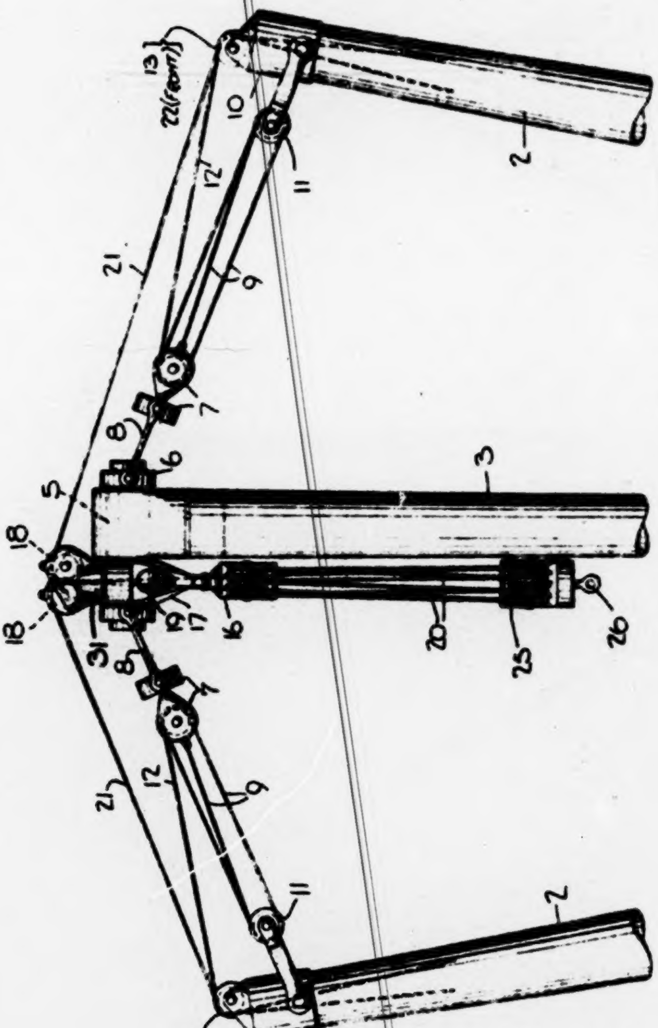
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Fig. 2

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SHIP'S CARGO BOOM WITH PENDULUM PURCHASE BLOCK FITTING

Filed Oct. 2, 1964 8 Sheets-Sheet 3

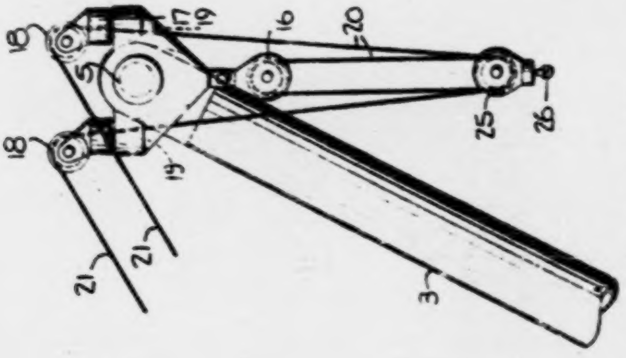
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Fig. 5.

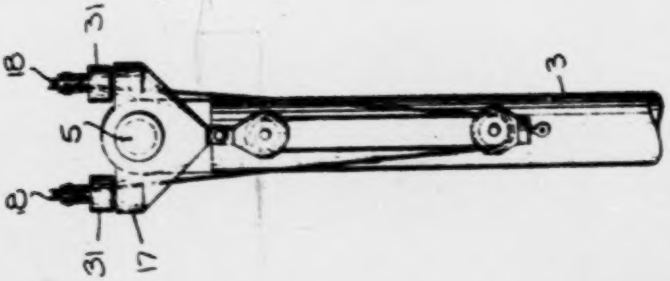
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Fig. 4.

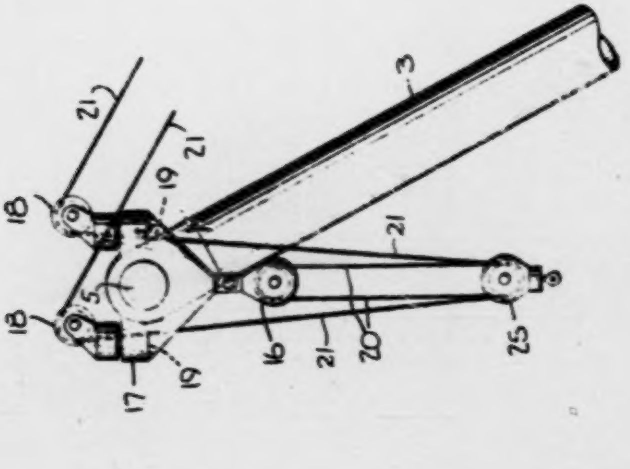
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Fig. 3.

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SHIP'S CARGO BOOM WITH PENDULUM PURCHASE BLOCK FITTING

Filed Oct. 2, 1964 8 Sheets-Sheet 4

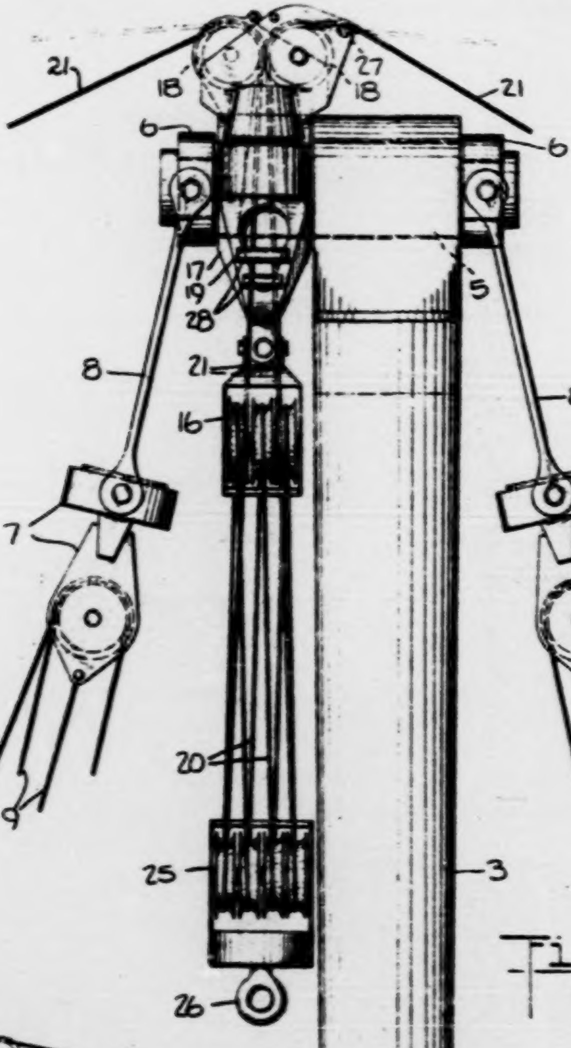
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Fig. 6.

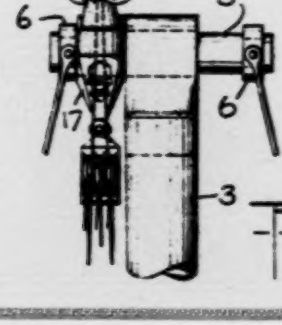

Fig. 5A.

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SHIP'S CARGO BOOM WITH PENDULUM PURCHASE BLOCK FITTING

Filed Oct. 2, 1964

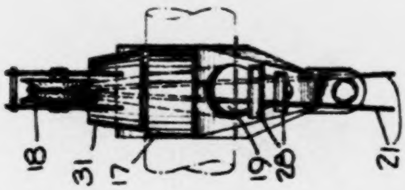
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Fig. 8.

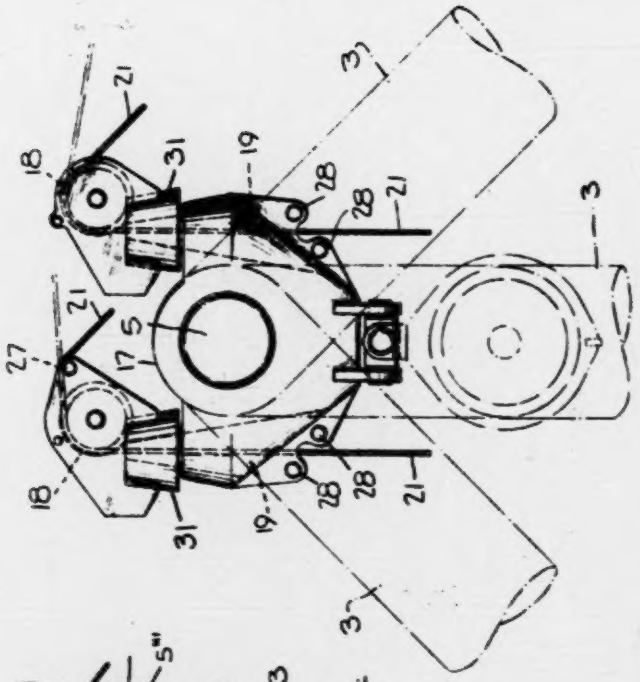
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Fig. 7.

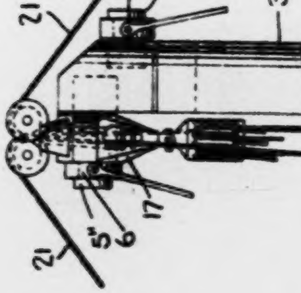
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Fig. 9a.

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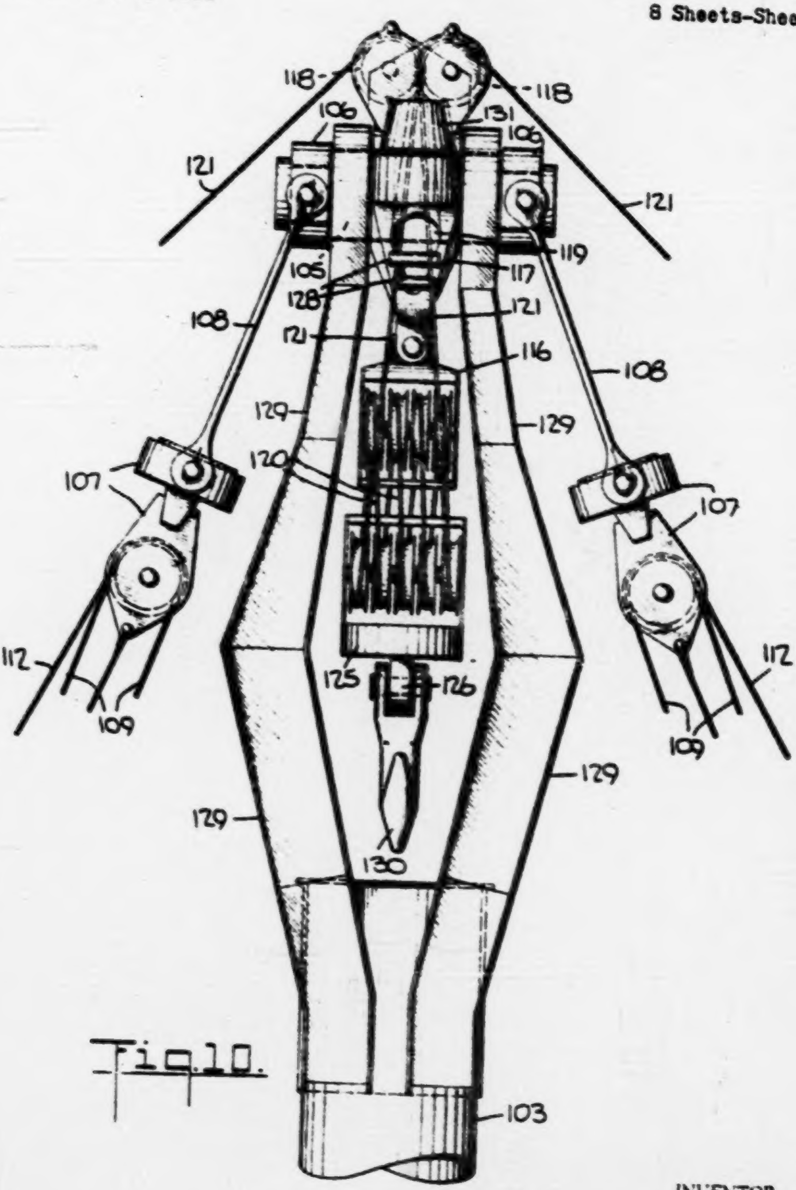
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Fig.10.

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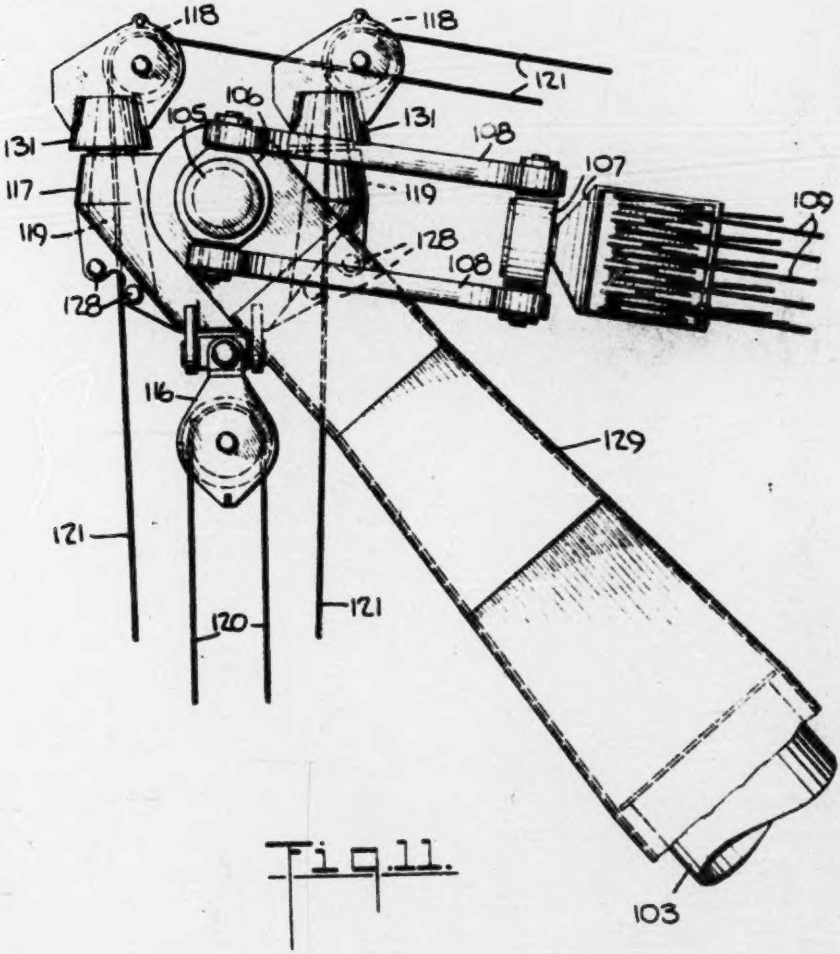
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Fig.11.

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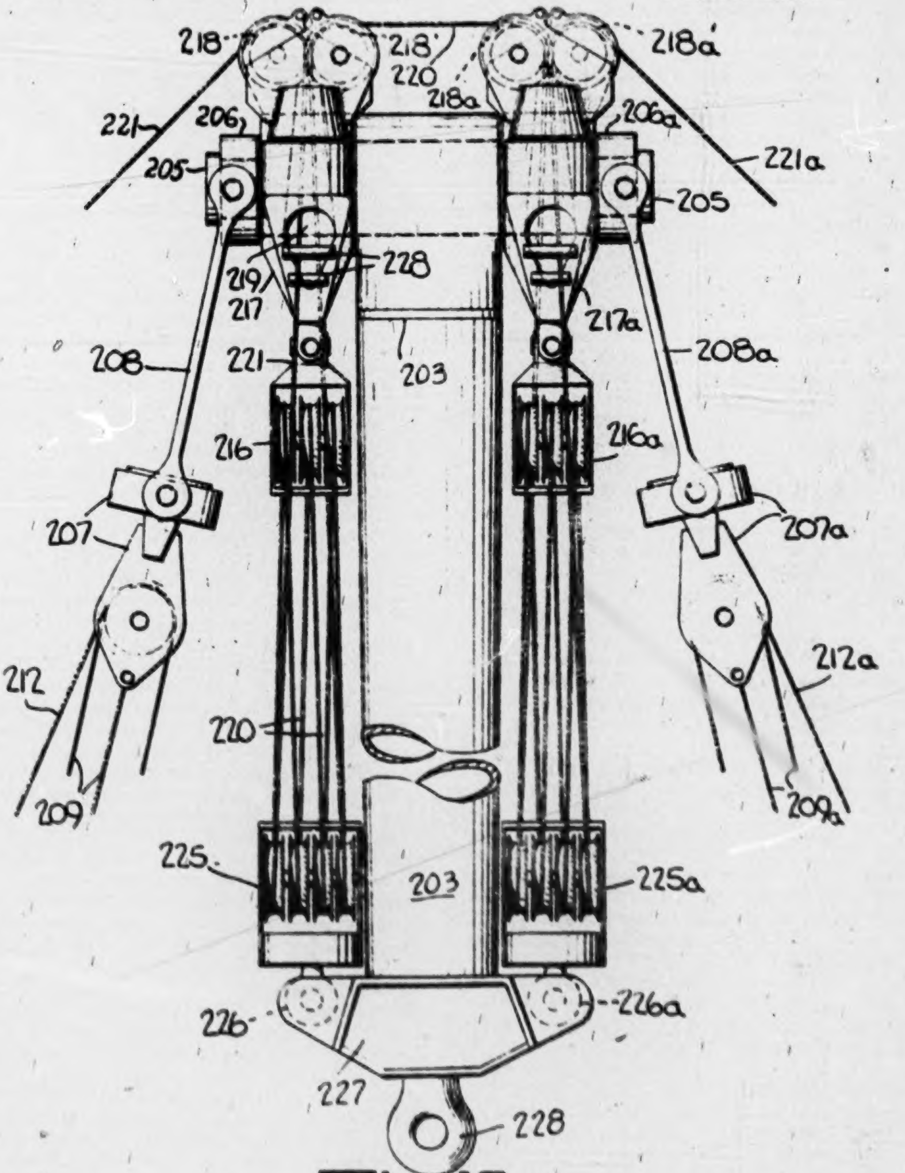
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Fig. 12.

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United States Patent Office

3,236,390
Patented Feb. 22, 1966

3,236,390
SHIP'S CARGO BOOM WITH PENDULUM PURCHASE BLOCK FITTING

Heinz Ferdinand Johannes Sprengel, Hamburg-Poppenbuttel, Germany, assignor to H. C. Stulcken Sohn, Hamburg-Steinwerder, Germany, a firm of Germany

Filed Oct. 2, 1964, Ser. No. 403,441
Claims priority, application Germany, Apr. 17, 1964, St 21,981
18 Claims. (Cl. 212—3)

This application is a continuation-in-part of my copending application, Serial Number 361,422 for Ship's Cargo Boom With Pendulum Purchase Block Fitting, which was filed in the United States Patent Office on April 21, 1964 and which has since been abandoned.

This invention relates to a ship's loading apparatus. It relates particularly to a cargo boom for a ship. It relates more particularly to a cargo boom intended to be installed in through-swinging manner between uprights on a ship's deck to serve hatches both forward and aft of the boom mounting, and it relates still more particularly to a cargo boom of the kind described which has a pendulum purchase block fitting adapted to swing or be swung past the boom in either direction depending upon whether the boom is serving a forward or an aft hatch.

A cargo boom arrangement of the kind described above is shown generally, for example, in United States Patent No. 2,914,193, issued November 24, 1959, to J. D. Köhnenkamp et al. In the arrangement shown in this patent the lower purchase block is hauled up to interlock with the upper purchase block when the boom is to be shifted either forward or aft, and then the composite block is pivoted as an inverted pendulum through a fork in the upper end of the cargo boom to the opposite side thereof when the boom is in vertical position. The hauling parts of both the span tackles and the purchase tackles stay free and remain on their respective winch drums throughout the whole operation of shifting the boom.

Along with the advantages of the foregoing-arrangement, however, there are certain operational short-comings. As mentioned already, the lower purchase block must be pulled all of the way up to the upper purchase block in a boom shifting maneuver, after which simultaneous operation with both span winches and both purchase winches is necessary in order to swing the interlocked purchase blocks through the cargo boom fork, and then lower the lower block. This whole maneuver requires special training of and practiced coordination between the boom operating personnel, and requires furthermore a considerable amount of time. It is also practically impossible in the maneuver to swing through the Flemish hook or a cargo shackle with the required cargo straps when attached to the lower purchase block. These parts must be first removed before the operation and then attached again after swinging through.

It is an object of the present invention to simplify the swinging through maneuver so that relatively untrained operating personnel can carry it out safely and without difficulty, and to reduce the time required for this maneuver to a minimum.

It is another object of the present invention not only to permit a cargo boom to be moved in a continuous manner from a position over a forward hatch to one over an aft hatch and vice versa, but also to permit it to alternate for short periods of time between positions over the forward and aft hatches for the loading and unloading of cargo.

For the accomplishment of the foregoing objects the present invention provides a cargo boom having at least one purchase block fitting at its upper end which is mounted to swing from side to side of the boom, that is, from

forward to aft of the boom and vice versa, as a normal rather than an inverted pendulum, and which is provided with two turning heads each of which carries a guide sheave above the upper end of the boom proper. Specific embodiments of this invention include one in which the purchase block fitting is overhung on its pivot pin alongside the boom, another in which the boom is forked at its upper end with the purchase block fitting being pivotally mounted within the fork structure and thus adapted to swing through the boom, and another in which a pair of purchase block fittings are rotatively overhung along opposite sides of the boom.

In the utilization of the present invention the hauling parts of a purchase tackle are led from a lower purchase block through passages in a novel fitting from which the purchase tackle and purchase block are suspended, to and over guide sheaves on this fitting, and from there either directly to guide sheaves in hollow rotating heads on top of the uprights between which the boom is mounted and between which it swings, or intermediately to another fitting, tackle, and block arrangement similar to the first. From the guide sheaves in the heads on top of the uprights, the hauling parts are led to guide sheaves within the uprights and thence out through slots in the walls of the uprights, going finally to the drums of two cargo winches.

When the boom is swung back or forth between the adjacent uprights to serve an aft or a forward hatch, the hauling parts are carried over the top of the boom throughout its whole movement as the purchase block fitting is at all times oriented substantially vertically downwardly as a normal pendulum from its pivot point at or very close to the boom's upper end. Thus the hauling parts of the purchase tackle, led over the guide sheaves on the inventive pendulum purchase block fitting as aforesaid, do not interfere at all with the swinging through maneuver.

The nature and substance of this invention as well as its objects and advantages will be more clearly perceived and fully understood by referring to the following description and claims taken in connection with the accompanying drawings in which:

FIG. 1 represents a view in starboard side elevation of an installation of a first embodiment of a cargo boom having a pendulum purchase block fitting according to the present invention, the fitting being overhung alongside the boom, and the boom itself in this particular illustration being inclined forward;

FIG. 2 represents a somewhat enlarged view in front elevation of the upper portion of the installation of FIG. 1, the boom itself in this particular illustration being in a substantially vertical position;

FIGS. 3, 4 and 5 represent somewhat enlarged views in starboard side elevation of the upper portion of the cargo boom forming part of the installation of FIGS. 1 and 2 with the boom respectively inclined aft, in vertical position, and inclined forward;

FIG. 6 represents a further enlarged view in front elevation of the upper portion of the cargo boom forming part of the installation of FIGS. 1 and 2, the turning guide sheaves on top of the pendulum block fitting being clearly shown in respect of details as these sheaves are oriented with the boom in vertical position;

FIGS. 7 and 8 represent enlarged starboard side and front views respectively of the pendulum purchase block fitting of the present invention, showing particularly the rope passage holes through the fitting and details of the turning guide sheaves on top of the fitting as these sheaves are oriented with the cargo boom on which the fitting is mounted being inclined aft;

FIG. 9A represents a view in front elevation of the upper portion of a cargo boom having a pendulum purchase block fitting generally similar to the showings of FIGS. 1 and 2, but with the pivot or head pin whereby the fitting is mounted on the boom extended beyond the boom opposite the fitting to provide an attachment point for one of the span tackles such that the points of attachment of both span tackles to the boom are equally offset from the boom's longitudinal axis;

FIG. 9B represents a view in front elevation of the upper portion of a cargo boom having a pendulum purchase block fitting generally similar to the showings of FIGS. 1 and 2, but with the pivot or head pin whereby the fitting is mounted on the boom and the span tackles attached to the boom of a split or two-piece construction, and the head of the boom beveled on one side to insure clearance of one of the hauling parts of the purchase tackle;

FIG. 10 represents a view in front elevation of the upper portion of a second embodiment of a cargo boom having a pendulum purchase block fitting according to the present invention, the fitting being hung within a forked structure at the upper end of the boom, and the boom itself in this particular illustration being in a substantially vertical position;

FIG. 11 represents a view in starboard side elevation of the upper portion of the boom of FIG. 10, the boom itself in this particular illustration being inclined aft, and

FIG. 12 represents a view in front elevation of the upper portion of a third embodiment of a cargo boom having a pair of pendulum purchase block fittings according to the present invention overhung on a single pivot pin along opposite sides of the boom.

Referring now to the drawings in detail, especially to FIGS. 1 and 2 thereof, two outwardly inclined hollow uprights 2 are positioned athwartship on ship's deck 1 between cargo hatches not shown. One of the hatches is considered to be forward of the uprights (to the right according to the starboard side view of FIG. 1), and the other to be aft of them (to the left according to FIG. 1). A cargo boom 3 located between the uprights is supported in a known, universally pivotable manner by gooseneck fitting 4. The cargo boom has at its upper end a strong head pin or pivot pin 5 which is carried through and across the boom. The head pin carries on one side a cross-swivel 6 serving for attachment of a span block 7 by means of connecting straps or flat links 8 in a known manner. The same arrangement is found on head pin 5 on the other side of cargo boom 3, and outside of the novel pendulum purchase block fitting 17.

The span tackles 9 extend between span blocks 7 and span blocks 11, the latter being attached in a vertically movable fashion to hollow heads 10 mounted on and fully rotatable with respect to uprights 2. The hauling parts 12 of the span tackles lead from span blocks 7 to the corresponding winch drums via guide sheaves 13 which are located on and in rotating heads 10, thence down through these heads and into the uprights and over guide sheaves 14 and 15 within the uprights, and finally through slots in the walls of the uprights and out of the uprights to span winches, not shown. The upper purchase block 16 is suspended from pendulum purchase block fitting 17. This fitting is attached sideways in a turnable or rotatable manner to head pin or pivot pin 5.

On top of pendulum block fitting 17 there are mounted two guide sheaves 18, each of which may be swiveled around on a hollow vertical axle or turning head 31 and each of which extends somewhat above the upper end of cargo boom 3. The hauling parts 21 of purchase tackle 20 lead from the lower purchase block 25 with swivel eye 26 through tapered passages 19 in the body portion of fitting 17 and axially aligned passages in heads 31 to each one of the two guide sheaves 18, and from there to guide sheaves 22 which are mounted in hollow rotating heads 10 on uprights 2 alongside guide sheaves 13 but which may turn independently of the latter sheaves.

Leaving guide sheaves 22, purchase tackle hauling parts 21 pass down through heads 10 and into uprights 2 and over guide sheaves 23 and 24 within the uprights. They finally pass through slots in the walls of the uprights and out of the uprights to purchase winches, not shown.

Referring next to FIGS. 3, 4, and 5, the cargo boom 3 is assumed to be broken out in the position of FIG. 3, that is, in a position in which it may be used to work the hatch aft of the uprights 2. The hauling parts 21 of purchase tackle 20 run through pendulum block fitting 17 via tapered passages 19, then over guide sheaves 18 on top of this fitting, and then to guide sheaves 22 (not shown in FIG. 3) on rotating heads 10 of the uprights. If the boom is now moved into the vertical or near vertical position shown in FIG. 4 by means of span tackles 9, then the purchase tackle moves sideways along one side of the cargo boom 3 as fitting 17 swings around head pin 5. In this operating position of cargo boom 3, that is, the position of FIG. 4, hauling parts 21 of the purchase tackle still lead to rotating heads 10 over guide sheaves 18 which have now turned around their vertical axes. The purchase tackle remains paid out, i.e., the lower purchase block 25 is raised only so high as not to interfere with the winches on deck and possibly other deck equipment. Cargo boom 3 can be moved by a light pull from its center or vertical position either to the left or to the right, that is, either aft or forward.

In its position of FIG. 5, cargo boom 3 has been moved over to the right, that is, moved forward. The hauling parts 21 are now running leftwardly or rearwardly to the upright heads 10, and the guide sheaves 18 on pendulum purchase block fitting 17 have turned further around on their hollow vertical axles so that the hauling parts of purchase tackle 20 are guided clear over the cargo boom. The purchase tackle and the swinging fitting 17 together with the lower purchase block 25 have turned about the head pin 5, which movement was caused by the weight of purchase tackle 20, including its upper and lower blocks 16 and 25, which is connected to and is suspended from fitting 17. Cargo boom 3 is now in a position in which it may be used to work the hatch forward of uprights 2.

The very simplified swinging through maneuver just described, that is, the maneuver of bringing cargo boom 3 from its position shown in FIG. 3 through that shown in FIG. 4 to that shown in FIG. 5, requires no specially trained operators. The cargo boom is pulled up from its aft inclination into almost vertical position by the span winches and is brought into the new or forwardly inclined working position after being pulled through the unstable vertical position by means of an attached wire pendant (not shown) which is led to any winch or other suitable pulling source. The purchase tackle remains essentially paid out in its natural working position.

The Flemish hook or cargo shackle and also the corresponding straps may remain attached to swivel eye 26 of the lower purchase block 25; that is, they need not be removed in order to swing the purchase blocks through as would practically be required in the course of using the apparatus shown in U.S. Pat. No. 2,914,193. The swinging through of the cargo boom and the parts hanging from it is thus simplified as well as quickened, so that the loading and unloading times for cargo are consequently shortened. All known special advantages of the split topping gear of the aforementioned patent remain fully intact in the apparatus of the present invention.

Referring next to FIGS. 6, 7, and 8, the details of the structural substance of the embodiment of the present invention so far described are illustrated in enlarged scale. The swivel 6, to which at one set of their ends are attached connecting flats 8 to which in turn at their other ends is attached span block 7, is supported on the right side (as seen in FIG. 6) in such manner that it can swivel around head pin 5. The span tackles 9 and their hauling parts 21 lead to one of the upright heads, neither of which is shown in the figures particularly under discussion. The same parts arranged in identical manner on head pin 5 are located on the left side (as seen in FIG. 6) outside of the pendulum block fitting 17.

The upper purchase block 16 is suspended on fitting 17 in a hinged manner. Suspended on the purchase tackle 20 is the lower purchase block 25 with swivel eye 26 for receiving, for example, a Flemish hook or cargo shackle. The hauling parts 21 of the purchase tackle 20 lead to the guide sheaves 18, via each one of openings 19 through pendulum block fitting 17 which swivels or pivots around head pin 5. Guide sheaves 18 are located on fitting 17 and swivel around hollow vertical mounts and lead the purchase tackle hauling parts 21 to the heads of the uprights in a manner pointed out already. If the uprights are very short in relation to the length of the cargo boom, the left guide sheave 18 (as seen in FIG. 7) which leads the wire or hauling part 21 over the cargo boom can be equipped additionally as shown in FIGS. 6 and 7 with a small guide roller 27 by means of which one of the hauling parts 21 of the purchase tackle is cleared over the upper end of the cargo boom during the swinging through maneuver.

The purchase tackle 20 hangs on one side of the cargo boom so that when the boom is swung through from one hatch to the other across the vertical position, the purchase tackle clears the boom 3 sideways. In all topping positions of cargo boom 3, the pendulum block fitting 17 remains practically vertical because the upper purchase block 16 is centrally attached in a hinged manner to the underside of fitting 17, which turns around head pin 5. Hereby, the guide sheaves 18 which carry the hauling parts 21 to lead these wires or parts over the upper end of the boom toward heads 10 on uprights 2 are automatically so adjusted that the wires remain free. Only for very short uprights is it necessary to provide the aforementioned small guide roller 27 so that for very steep downward run-off angles the particular hauling part 21 that has to be carried across the top of cargo boom 3 is held sufficiently high by this guide roller 27. Another arrangement for insuring clearance of this hauling part is shown in FIG. 9B.

In order to avoid fouling the hauling parts 21 on the lower ends of passage openings 19, when said parts 21 pass through the pendulum block fitting 17, small guide rollers 28 are provided on this fitting parallel to the axis of pivot pin or head pin 5, sideways below the passage openings 19. Therefore, the hauling parts of the purchase tackle are always passing through the central area of openings 19 in pendulum block fitting 17.

The actual position of pendulum block fitting 17 relative to the cargo boom is shown in the assumed positions of cargo boom 3 in FIG. 7 when the boom is swung through from one hatch to the other. For example, the guide sheaves are shown on a boom that is reaching out to the left, i.e., the purchase tackle hauling parts are running to the right to each one of the hollow rotating heads on the uprights. The hauling parts are passing through the hollow rotating axles of the guide sheaves 18 which insures easy swiveling of these guide sheaves even when there is no load attached to the purchase tackle. If there be only one cargo winch provided for the operation of the purchase tackle, then one of the hauling parts 21 is attached to hollow head 10 on one of the uprights 2. The guide sheaves 22, 23, and 24 which belong to the purchase tackle hauling part of this particular upright are eliminated. The swinging through maneuver and the operation of the boom remain, however, unchanged.

Referring next to FIG. 9A, the situation is contemplated that a small ship or a slender one having a low margin of stability may be equipped with a large cargo gear, or generally that stability may be a consideration, and mirror-like symmetrical forces from the span tackles should become effective on the cargo boom when slewing cargo boom 3 to port side or starboard side by means of the span tackles 9. A slight modification of the invention as so far disclosed provides that the span tackle 9 which is positioned on the side of the boom with only the swivel 6 on the extended head pin 5', that is, on the side of the boom opposite fitting 17, will have a point of attachment to the boom which is equally distanced or offset from the boom's longitudinal axis with the attachment point of the span tackle running to the swivel 6 which is positioned next to the pendulum block fitting 17.

Referring next to FIG. 9B, a slight further modification of arrangements at the upper end of cargo boom 3 is shown. In this modification, the pivot or head pin is in two pieces 5'' and 5'''. These two pieces or pin portions are set in the boom at slightly different levels with portion 5'' carrying the pendulum purchase block fitting being at the higher level. The head of the boom above oppositely disposed pin portion 5''' at the lower level is beveled downwardly to provide ample clearance in the swinging through maneuver of one of the purchase tackle hauling parts 21 above the upper end of the boom as well as above the lower level pin portion 5''' and the span tackle cross swivel mounted on it.

Through the substance of the present invention as so far disclosed, a novel ship's loading apparatus has been realized which, in comparison with known apparatuses where a cargo boom also swings between uprights, makes it possible that the associated tackles and hauling parts are automatically guided free so that these wires can remain on their winch drums, and so additionally that fittings such as the Flemish hook and the cargo shackle and straps need no longer be removed. Time and cost economies result from this for the loading operation which are particularly valuable for small size cargoes or medium weights which must be loaded on board in larger quantities than heavy cargoes in order to utilize more fully the ship's carrying capacity. However, for the latter cargoes also the loading and unloading by means of the apparatus of the present invention becomes operationally simpler, time-wise shorter, and consequently cheaper and safer than with cargo gears known until now.

Referring next to FIGS. 10 and 11, a second embodiment of a cargo boom provided with a pendulum purchase block fitting according to the present invention is illustrated. With particular reference to FIG. 10, located on the head pin 105 which closes the ends of fork sides 129 forming a boom extension at the upper end of a cargo boom 103 there are on the outside left and outside right one swivel 106, each with connecting straps or flat links 108 and span blocks 107. The span tackles 109 and their hauling parts 112 lead to guide sheaves on the rotating heads of the two uprights (not shown) and from there, via guide fittings, to the corresponding winch drums in known manner.

The purchase tackle 120 with the upper purchase block 116 and the lower purchase block 125 having a swivel eye 126 and a Flemish hook 130 is suspended on the universal joint of the pendulum block fitting 117. This fitting is located centrally between the fork sides 129 of cargo boom 103 on head pin 105 so that forces from the loading of the purchase tackle 120 can not be applied to the centerline of the boom unsymmetrically.

Pendulum purchase block fitting 117 itself is surmounted by two guide sheaves 118 over which the hauling parts 121 of purchase tackle 120 pass. These parts also pass through tapered openings 119 in fitting 117 and through hollow axles 131 about which guide sheaves 118 can turn, and lead from these sheaves to sheaves on the rotating heads on the uprights between which the cargo boom is mounted. From the sheaves on these heads, the purchase tackle hauling parts pass down through the heads and the uprights themselves and over appropriate guide devices, and are led finally to the drums of purchase or cargo winches. When swinging the cargo boom through, the purchase tackle hauling parts are always automatically freely guided by means of pendulum block fitting **117** and the guide sheaves **118** on this fitting.

FIG. 11 shows the upper end of cargo boom **103** with the arms of the fork **129**, the whole structure being inclined for a working position over a hatch aft of the boom and its adjacent uprights, as an example. In a known manner, the span blocks **107** whose tackles **109** lead to the uprights are rotatably connected to either side of the head pin **105** by means of straps **108** and swivels **106**. Pendulum block fitting **117** is located between the fork arms **129**, and can turn around pivot pin or head pin **105**. Coming from the lower purchase block, not shown in FIG. 11, are the purchase tackle hauling parts **121** which lead in a known manner to the uprights, being guided by guide rollers **128** through the tapered openings **119** in the pendulum block fitting and the hollow axles **131** of the guide sheaves **118** mounted on this fitting and forming part of the fitting assembly.

On account of the weight of the purchase tackle and purchase blocks suspended from it, fitting **117** is always held essantially perpendicular in all positions of cargo boom **103**. As a consequence of this, the guide sheaves **118** always lead the hauling parts **121** of the purchase tackle **120** freely over the upper ends of the fork arms **129**, and thus over the boom **103**, whenever the cargo boom is swung through from a working position over a hatch forward of it to one over a hatch aft of it, and vice versa.

The embodiment of a cargo boom provided with a pendulum purchase block fitting according to the present invention which is shown in FIGS. 1 and 2 is not quite as suitable as that shown in FIGS. 10 and 11 for handling loads in the very high weight ranges. This is because the one-sided attachment or overhung or cantilever mounting of fitting **17** in the first embodiment requires quite a heavy construction of the boom apparatus itself to withstand columnar bending moments when massive weights are to be lifted. On the other hand, unlike the embodiment shown in FIGS. 1 and 2, the second embodiment of this invention shown in FIGS. 10 and 11 does require its lower purchase block **125** and Flemish hook **130** to be hauled up quite close to its upper purchase block **116** for the swinging through maneuver of the cargo boom. Thus the embodiment shown in FIGS. 10 and 11 is not quite as suitable as that shown in FIGS. 1 and 2 when there is to be frequent alternation of the boom between a working position over a hatch forward of the boom and one aft of it. It may reasonably be expected, however, that when the inventive embodiment shown in FIGS. 10 and 11 is handling the large and heavy loads for which it is well suited the normal pace of operations will be a relatively slow one and the requirements for alternation of working positions between hatches infrequent.

Referring finally to FIG. 12, a third embodiment of a cargo boom provided with at least one pendulum purchase block fitting according to the present invention is illustrated. Specifically, there is shown a cargo boom provided with two such fittings.

In this embodiment, topping blocks **207**, **207*a*** are connected to head bolt **205** by means of connecting flats **208**, **208*a*** and swivels **206**, **206*a***. The hauling parts **212**, **212*a*** of the topping tackle as well as parts **209**, **209*a*** run, in known manner, to uprights and then to winches (not shown).

Hauling part **221** of the purchase tackle runs, in known manner, from a purchase winch (not shown), over the head of the left upright (not shown), to guide sheave **218**, located on left hand purchase block fitting **217**, which sheave is directed toward the left according to the orientation of the turning head which supports it. From there hauling part **221** goes through a tapered passage **219**, past guide rollers **228**, which are located at

the lower end of passage **219** to alleviate rubbing, and then to lower purchase block **225**, which has padeye **226**.

Purchase tackle runner **220** connects lower purchase block **225** with upper purchase block **216**, and runs from lower purchase block **225** through tapered passage **219**, past guide rollers **228**, to guide sheave **218'** of left hand purchase block fitting **217**, which guide sheave is directed toward the right on its turning head.

From there, purchase tackle runner **220** goes to guide sheave **218*a*** on right hand purchase block fitting **217*a***, which guide sheave is directed toward the left. Then, purchase tackle runner **220** proceeds mirror-like through the right purchase tackle half, through purchase blocks **216*a*** and **225*a*** which hang on the right hand purchase block fitting, to guide sheave **218*a*'** located on and above fitting **217*a***, which guide sheave is directed toward the right. From there hauling part **221*a*** runs in known manner to the head of the right hand upright, and then continues to the corresponding purchase winch. If only one purchase winch is provided, then one of the hauling parts **221**, **221*a*** is fastened to the head of the corresponding upright.

The cargo boom **203** can be brought into any desired position by means of the topping tackles **209**, **209*a***. The work load hangs on the padeyes **226**, **226*a*** of the lower purchase blocks **225**, **225*a***. Inasmuch as the purchase tackle runner **220** is guided through the purchase blocks right and left of cargo boom **203** in a continuous manner, substantially no uneven distribution of forces develops in the purchase tackle, if friction forces are disregarded. If desired, the two lower purchase blocks **225**, **225*a*** can be connected by a transverse traverse **227** which has a swivel padeye **228** in the middle.

In the embodiment of the present invention shown in FIG. 12, the topping blocks **207**, **207*a*** are preferably structurally identical, as are the purchase block fittings **217**, **217*a***, the upper purchase blocks **216**, **216*a***, and the lower purchase blocks **225**, **225*a***. In this embodiment, by virtue of the symmetrical arrangement of two structurally identical pendulum purchase block fittings rotatively arranged on the head bolt on opposite sides of the cargo boom head, the cargo boom remains substantially free from the forces and moments which develop in the embodiment of FIGS. 1–6 due to the presence of a pendulum purchase block fitting on only one side of the cargo boom. As a result, with the invention embodiment shown in FIG. 12 a given cargo boom is suitable for a higher work load. Similarly, a given maximum work load capacity is obtainable with a cargo boom of smaller structural weight and, consequently, with a generally less expensive cargo boom.

The swinging through maneuver of the cargo boom takes place for the embodiment of this invention illustrated in FIG. 12 by pulling up the purchase tackle far enough so that any cargo slings which are left attached to it do not interfere with winches or other pieces of deck equipment, and then swinging cargo boom **203** through between the left and right purchase tackle halves. In such event, the transverse traverse **227** is first removed.

Protection by Letters Patent of the present invention in all its aspects as the same are set forth in the appended claims is sought to the broadest extent that the prior art allows.

What is claimed is:

1. The combination comprising (1) a ship's deck, (2) a cargo boom disposed above said deck, said cargo boom having an upper end and a lower end, (3) pivot mounting means for said cargo boom disposed between the lower end thereof and said deck, said mounting means permitting rotation of said cargo boom in a vertical plane to swing through between uprights, and (4) a purchase block fitting adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, said fitting being pivotally mounted on said

boom near the upper end thereof in a manner permitting it to swing from side to side thereof as a normal pendulum in the direction of motion of said boom between uprights, and said fitting including guide means extending above the upper end of the boom which is adapted to receive the hauling parts of the purchase tackle and direct each of the same toward an upright.

2. The combination comprising (1) a ship's deck, (2) a pair of uprights mounted on said deck, each of said uprights having an upper head end, (3) a cargo boom disposed above said deck, said cargo boom having an upper end and a lower end, (4) pivot mounting means for said cargo boom disposed between the lower end thereof and said deck, said mounting means being located between said uprights substantially in line with them, and permitting rotation of said cargo boom in a vertical plane to swing through between the uprights, (5) span tackles extending from said boom near the upper end thereof to the upper head end of each of said uprights, and (6) a purchase block fitting adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, said fitting being pivotally mounted on said boom near the upper end thereof in a manner permitting it to swing from side to side thereof as a normal pendulum in the direction of motion of said boom between the uprights, and said fitting including guide means extending above the upper end of the boom which is adapted to receive the hauling parts of the purchase tackle and direct each of the same toward the upper head end of an upright.

3. The combination comprising (1) a cargo boom having an upper end and a lower end, and (2) a purchase block fitting adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, said fitting being pivotally mounted on said boom near the upper end thereof in a manner permitting it to swing from side to side thereof as a normal pendulum with said boom in substantially upright position, and said fitting including guide means extending above the upper end of said boom in upright position which is adapted to receive the hauling parts of the purchase tackle, and direct the same away from said boom.

4. The combination according to claim 3 in which said purchase block fitting is characterized by internal passage space through which the hauling parts of the purchase tackles can extend going to said guide means.

5. The combination according to claim 4 in which said internal passage space has at least one lower opening and in which said purchase block fitting further includes guide means below said lower opening to maintain the hauling parts of the purchase tackle substantially centered in said internal passage space.

6. The combination comprising (1) a cargo boom having an upper end and a lower end, and (2) a purchase block fitting adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, said fitting being pivotally mounted on said boom near the upper end thereof in a manner permitting it to swing from side to side thereof as a normal pendulum with said boom in substantially upright position, and said fitting including two turning heads and a guide sheave mounted on each of said heads, each of said guide sheaves extending above the upper end of said boom in upright position and each adapted to receive a hauling part of the purchase tackle, and direct the same away from said boom.

7. The combination according to claim 6 in which said purchase block fitting is characterized by two internal passages extending through a body portion of said fitting and continuing through said turning heads, each of said passages being adapted to receive a hauling part of the purchase tackle passing to one of said guide sheaves.

8. The combination according to claim in which said purchase block fitting further includes a guide roller mounted on one of said turning heads for giving additional elevation to the hauling part of the purchase tackle passing over the guide sheave mounted on that head.

9. The combination according to claim 6 which further comprises (3) a first pivot pin extending from one side of said boom whereon said purchase block fitting is pivotally mounted immediately adjacent said boom, and which is adapted to have a first span tackle connected to it beyond said fitting, and (4) a second pivot pin extending from the opposite side of said boom at a level slightly lower than that of said first pivot pin and which is adapted to have a second span tackle connected to it, the upper end of said boom being beveled downwardly toward said second pivot pin.

10. The combination comprising (1) a cargo boom having an upper end and a lower end, (2) a head pin extending transversely from at least one side of said cargo boom near the upper end thereof, and (3) a purchase block fitting adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, said fitting being pivotally mounted closely adjacent said cargo boom on the extension of said head pin to swing from side to side of said cargo boom as a normal pendulum with said boom in substantially upright position, and said fitting including guide means extending above the upper end of said boom in upright position which is adapted to receive the hauling parts of the purchase tackle, and direct the same away from said boom.

11. The combination according to claim 10 in which said head pin extends transversely from two opposite sides of said cargo boom to provide attachment points for span tackles at equal distances from the longitudinal axis of the boom, one of these attachment points being beyond said purchase block fitting.

12. The combination comprising (1) a cargo boom having an upper end and a lower end, (2) a fork extension of said cargo boom at the upper end thereof, said fork extension being open at its end distant from the upper end of said cargo boom, (3) a head pin extending across said fork extension near the open end thereof, and (4) a purchase block fitting adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, said fitting being pivotally mounted on said head pin between the sides of said fork extension to swing from side to side of said cargo boom through said fork extension thereof as a normal pendulum with said boom in substantially upright position, and said fitting including guide means extending above the open end of said fork extension with said boom in upright position, said means being adapted to receive the hauling parts of the purchase tackle, and direct the same away from said boom.

13. The combination according to claim 12 in which the fork extension of said cargo boom is sufficiently long that an upper and lower purchase block and associated purchase tackle suspended from said purchase block fitting and a Flemish hook suspended from the lower purchase block can be swung through said fork extension from side to side of said boom above the upper end thereof by normal pendulum pivoting action of said purchase block fitting on said head pin.

14. The combination comprising (1) a cargo boom having an upper end and a lower end, (2) a head pin extending transversely from opposite sides of said cargo boom near the upper end thereof, and (3) a pair of purchase block fittings, each fitting adapted to have an upper and a lower purchase block and associated purchase tackle suspended from it, each fitting being pivotally mounted closely adjacent said cargo boom to swing from side to side of said cargo boom as a normal pendulum with said boom in substantially upright position, one fitting being so mounted on one extension of said head pin and the other fitting being so mounted on the opposite extension of said head pin, and each fitting including guide means extending above the upper end of said boom in upright position which is adapted to receive the hauling parts of

the purchase tackle, and direct the same away from said boom.

15. The combination according to claim 14 in which said head pin extends sufficiently transversely from two opposite sides of said cargo boom to provide attachment points for span tackles at equal distances from the longitudinal axis of the boom, each of these attachment points being beyond the purchase block fitting mounted on the respective extension.

16. The combination comprising (1) a cargo boom having an upper end and a lower end, (2) a head pin extending transversely from opposite sides of said cargo boom near the upper end thereof, (3) a pair of purchase block fittings, each fitting being pivotally mounted closely adjacent said cargo boom to swing from side to side of said cargo boom as a normal pendulum with said boom in substantially upright position, one fitting being so mounted on one extension of said head pin and the other fitting being so mounted on the opposite extension of said head pin, and each fitting including guide means extending above the upper end of said boom in upright position which is adapted to receive the hauling parts of the purchase tackle and direct the same away from said boom, (4) a pair of upper purchase blocks, each suspended from a purchase block fitting, (5) a pair of lower purchase blocks, each suspended from an upper purchase block and each having a padeye depending therefrom, and (6) a transverse traverse with a centrally located swivel padeye connected to the two aforesaid padeyes.

17. The combination according to claim 16 further characterized by (7) a purchase tackle runner which runs through both said purchase block fittings.

18. The combination comprising (1) a cargo boom having an upper end and a lower end, (2) a head pin extending transversely from opposite sides of said cargo boom near the upper end thereof, (3) a pair of purchase block fittings, each fitting being pivotally mounted closely adjacent said cargo boom to swing from side to side of said cargo boom as a normal pendulum with said boom in substantially upright position, one fitting being so mounted on one extension of said head pin and the other fitting being so mounted on the opposite extension of said head pin, and each fitting including guide means extending above the upper end of said boom in upright position which is adapted to receive the hauling parts of the purchase tackle and direct the same away from said boom, (4) a pair of upper purchase blocks, each suspended from a purchase block fitting, and (5) a pair of lower purchase blocks, each suspended from an upper purchase block and each having a padeye depending therefrom.

References Cited by the Examiner

UNITED STATES PATENTS

2,914,193	11/1959	Kohnenkamp et al.	212—3
3,042,222	7/1962	Lehmann	212—3
3,107,790	10/1963	Lehmann	212—3

FOREIGN PATENTS

937,992	1/1956	Germany.

SAMUEL F. COLEMAN, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,236,390 February 22, 1966

Heinz Ferdinand Johannes Sprengel

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, lines 8 and 9, for "Claims priority, application Germany, Apr. 17, 1964, St 21,981" read -- Claims priority, applications Germany, Oct. 12, 1963, St 21,185; Oct. 21, 1963, St 21,219; Apr. 17, 1964, St 21,981 --; column 9, line 73, after "claim" insert -- 6 --.

Signed and sealed this 7th day of March 1967.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents

APPENDIX I

Patent to Ashe No. 1,257,664

(PHOTOSTATS)

(See opposite ☛)

W. B. ASHE.

DAVIT.

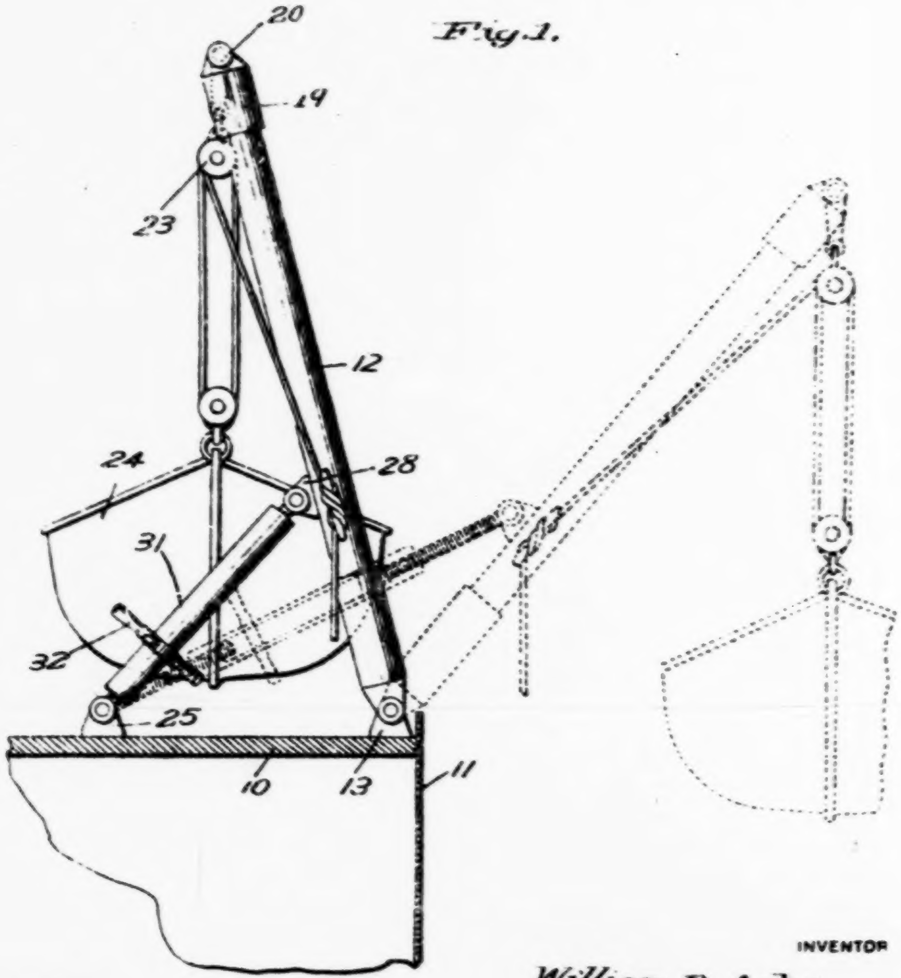
APPLICATION FILED MAR. 23, 1917.

1,257,664.

Patented Feb. 26, 1918.

2 SHEETS—SHEET 1.

Fig.1.



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APPLICATION FILED MAR. 23, 1917.

1,257,664. Patented Feb. 26, 1918.

2 SHEETS—SHEET 2.

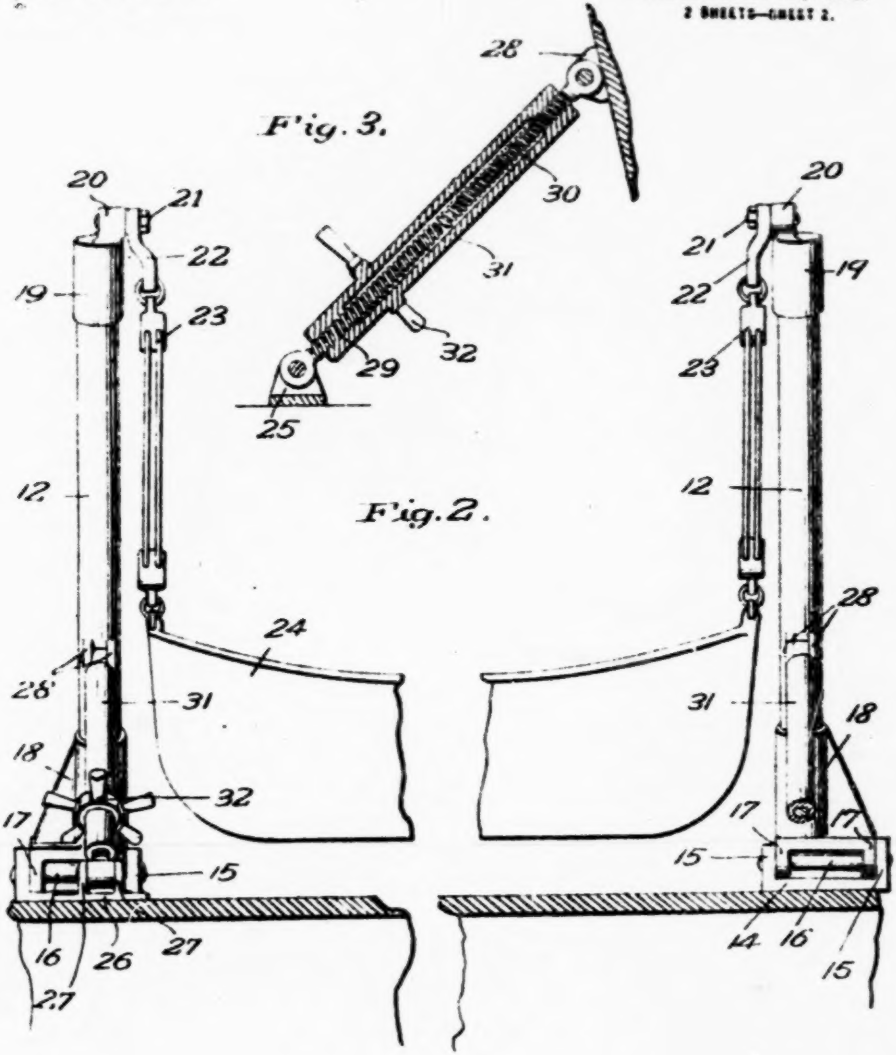
Fig. 3.
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1,257,664. **Specification of Letters Patent.** Patented Feb. 26, 1918.

Application filed March 23, 1917. Serial No. 157,046.

To all whom it may concern:

Be it known that I, WILLIAM B. ASHE, a citizen of the United States, residing at Hampton, in the county of Elizabeth City and State of Virginia, have invented certain new and useful Improvements in Davits, of which the following is a specification.

This invention has relation to davits for supporting life boats or the like, on board ship, and has for an object to provide davits of novel construction adapted to support a life boat normally over the deck of a vessel, with means whereby the boats may be readily lowered to the surface of the water.

Another object of the invention is to provide improvements in ship davits with a view to avoiding the rotatably mounted davits at present largely in use, thereby obviating the possibility of entangling the block and tackle, and to insure movement of the boat to a position whereby it may be quickly and readily lowered.

In addition to the foregoing my invention comprehends improvements in the details of construction and arrangement of parts to be hereinafter more fully described and particularly set forth in the appended claim.

In the accompanying drawings in which similar and corresponding parts are designated by the same characters of reference throughout the several views in which they appear:

Figure 1, is a view in end elevation, partly in section of ship davits constructed in accordance with my invention.

Fig. 2, is a view of a pair of ship davits in side elevation with a life boat supported therebetween, and

Fig. 3, is a detail view in section illustrating the mechanism for moving the davits from a normal position to an operative position.

With reference to the drawings 10 indicates the deck of a vessel and 11 the upper edge of the side of the hull.

My improved ship davit comprises a pair of supports 12 which may be of tubular material, adapted to be disposed in a substantially vertical position in spaced relation with their lower ends pivotally connected to brackets 13 which are located upon the deck adjacent the edge thereof. Each bracket 13 comprises a base plate 14 having upstanding ears 15 at either end thereof in longitudinal spaced relation. The ears or lugs 15 are apertured to receive a bolt 16 which also penetrates a pair of ears 17 apertured to receive the bolts and formed upon a casting 18 which receives the lower end of the tubular support 12. Each support 12 is provided with a casting 18 and mounted upon a bracket 13 in the manner set forth above whereby said support may be moved from the position over the deck to a position whereby their upper terminals are disposed beyond the side of the hull as shown in dotted lines in Fig. 1 of the drawings.

The upper end of each support 12 is provided with a tubular cap 19, threadedly or otherwise secured to said support, said caps having apertured ears 20 at their upper ends through which bolts 21 pass, said bolts also supporting hangers 22 which are offset laterally, having both ends apertured, one end to receive the said bolts 21 and the other end to receive securing means for the usual block and tackle indicated generally at 23. The block and tackle is adapted to support the life boat indicated at 24, and it will be noted that owing to the offset relation of the hangers 22, said hangers being offset toward each other, the life boat is permitted to oscillate between the supports 12 without possibility of engaging either.

For moving the supports 12 from a position above the deck to a position beyond, I provide a shifting mechanism illustrated in detail in Fig. 3, a mechanism of this character being associated with each support 12. Each shifting mechanism includes a bracket 25, a pair of which are provided for each pair of davits, each bracket 25 being located adjacent one of the brackets 13 but spaced therefrom in a direction transversely of the ship. Each bracket 25 includes a base plate 26 and a pair of apertured upstanding ears 27. Each support 12 is formed with a pair of spaced ears 28 located on the side of said support directed toward the ship. Each bracket 25 and each pair of ears 28 support therebetween threaded rods 29 and 30 respectively, each pair of rods 29 and 30 being directed toward each other and inserted in a turn-buckle 31 which is of tubular construction. The rods 29 and 30 are threaded in reverse directions, and opposite ends of the turn-buckle 31 are internally threaded in a complementary manner, whereby, rotation of the turn buckles will move the rods toward or away from each other according to which direction the turn buckles are rotated. Each turn buckle may have a series of integrally formed radial arms 32 whereby the turn buckles may be manually rotated.

It will be obvious that if the supports 12 are in a position over the deck, the life boat will be suspended over the deck within the side of the hull, and preferably with the supports 12 in an inclined position. To move the life boat beyond the side of the hull so that it may be lowered, each turn buckle 31 of the pair of davits is rotated in the proper direction whereby to oscillate the supports 12 to a position shown in dotted lines in Fig. 1 wherein the supports are inclined outwardly beyond the side of the hull whereby the life boat will be properly suspended, and by releasing the block and tackle it may be slowly lowered to the surface of the water. Obviously, the supports 12 may be returned to their former position by rotating the turnbuckles in a reverse direction.

It will be obvious from the foregoing that as the motion of the life boat in moving from a position over the deck to a position beyond, it moves in one direction only, and not two directions as in the case of the conventional form of davits wherein the davits are pivotally mounted and the boat is compelled to execute a circular motion before passing over the side of the hull. Furthermore, owing to the cranelike formation of the conventional form of davits, the distance to which the boats may be projected beyond the side of the hull is limited, while in the present case the supports may be of any desired lengths thereby permitting the projection of the life boats far beyond the side of the hull, thereby obviating the possibility of smashing the boats against the side of the hull.

While I have illustrated and described my invention with some degree of particularity, I realize that in practice various alterations thereover may be made, and I therefore desire to reserve the right and privilege of changing the form of the details of construction, or otherwise altering the arrangement of the correlated parts without departing from the spirit of the invention, or the scope of the appended claim.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

A ship davit including an arm, a sleeve casting to receive the lower end thereof, a pair of spaced ears formed on said casting, a plate designed to be secured to the deck and having a pair of upstanding ears to receive the spaced ears of the casting therebetween, a bolt penetrating the ears of the plate and casting to pivotally mount the arm, a cap mounted on the opposite end of the arm, an apertured lug formed on said cap, a link offset and pivotally connected at one end to the lug of the cap, a pair of spaced ears formed on the arm, a deck plate formed of spaced ears, a pair of alined threaded rods, one being connected at a remote end to the ears of the second mentioned deck plate and the other connected at its remote end to the ears of the arm, and an internally threaded sleeve to receive the adjacent ends of the threaded rods whereby the arm may be oscillated for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM B. ASHE.

Witnesses:
B. B. PHILLIPS,
P. P. PHILLIPS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

APPENDIX J

Lehmann's '790 Patent

(PHOTOSTATS)

(See opposite ☛)

Oct. 22, 1963 G. W. LEHMANN 3,107,790

CARGO RIG

Filed Dec. 6, 1960 4 Sheets-Sheet 1

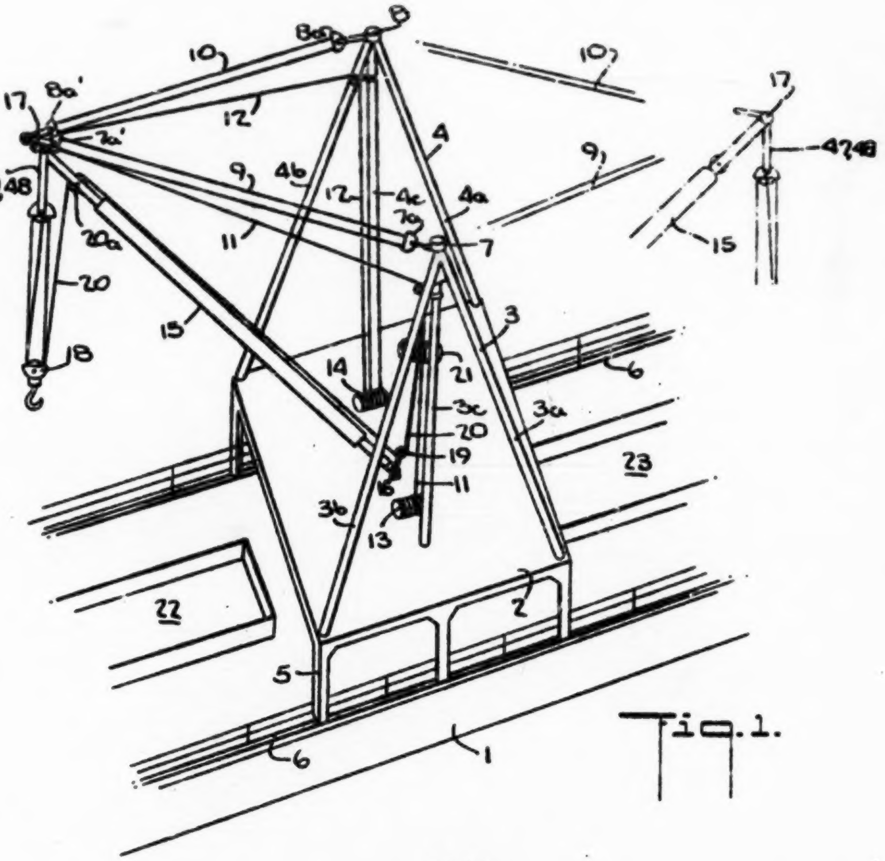
8
8a
10
10
17
8a'
7a'
12
12
4
4b
4c
4a
9
9
47&48
20a
11
7a
7
20
15
3
18
14
21
6
3c
3a
20
19
16
11
23
3b
13
22
2
5
6
1
17
47&48
15

Fig. 1.

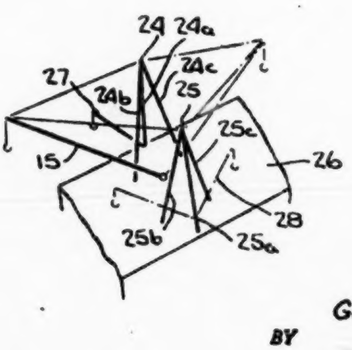
24
24a
24c
27
24b
25
25c
15
26
28
25b
25a

Fig. 2.

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Erich M. H. Radde
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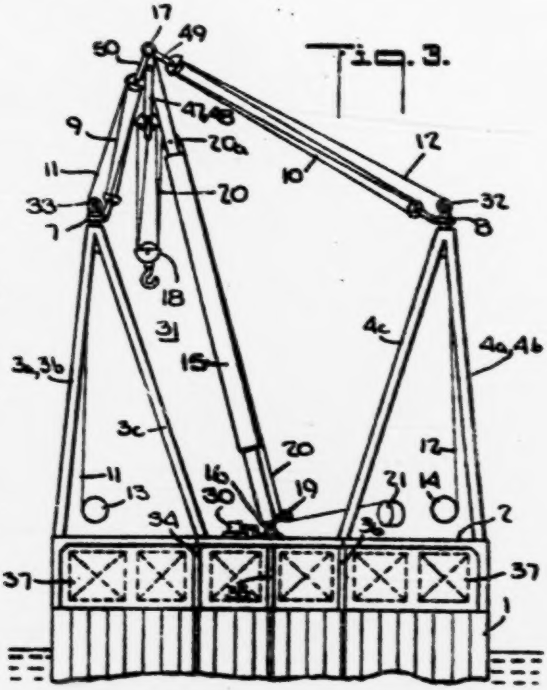
17
49
50
47,48
9
20a
12
10
11
20
33
32
7
8
18
31
4c
4a,4b
3a,3b
15
3c
20
12
11
13
16
30
19
21
14
34
36
2
37
35
37
1

Fig. 3.

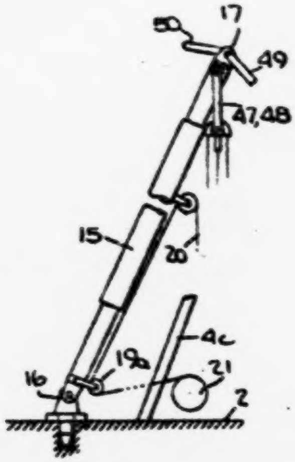
50
17
49
47,48
15
20
4c
16
19a
21
2

Fig. 3A.

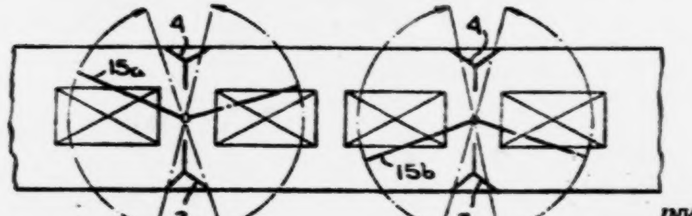
34
15a
34
15b
38
39
40
41

Fig. 4.

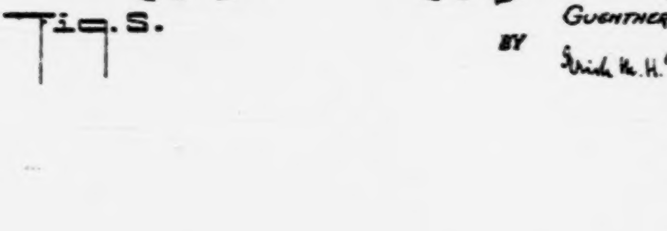
4
4
15a
15b
3
3

Fig. 5.

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Oct. 22, 1963 G. W. LEHMANN 3,107,790

CARGO RIG

Filed Dec. 6, 1960

4 Sheets-Sheet 3

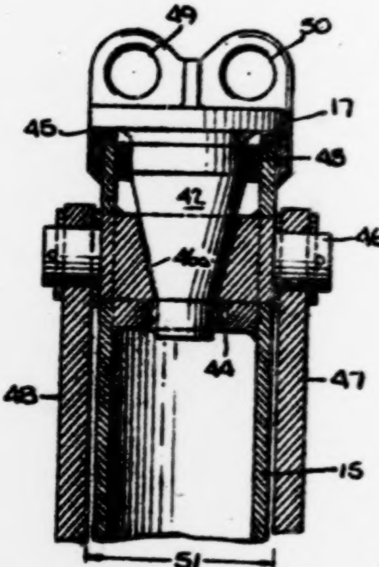

49
50
45
17
45
42
46
46a
44
48
47
15
51

Fig. 6.

Fig. 7.

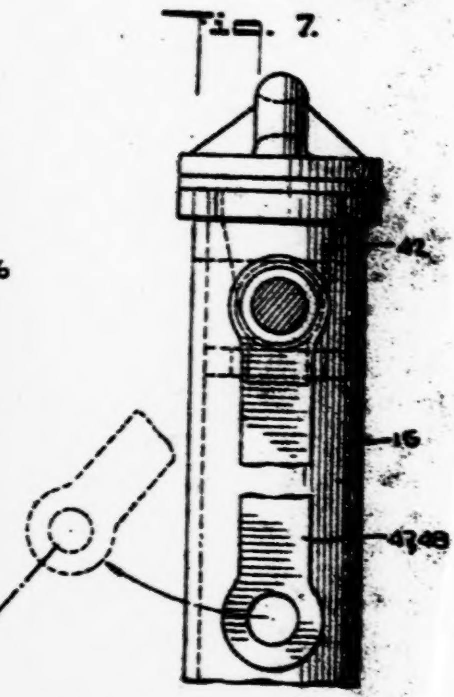


Fig. 8.

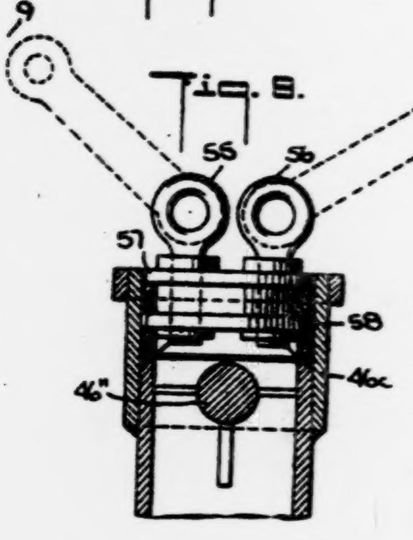
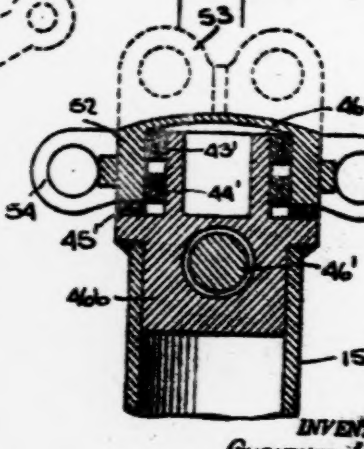

9
10
55
56
57
58
46"
46c

Fig. 9.


53
52
46b'
43'
44'
54
45'
46'
46b
15

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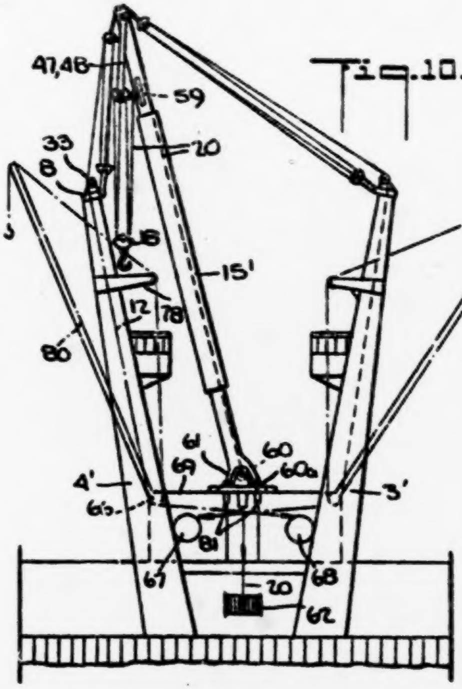
Oct. 22, 1963 G. W. LEHMANN 3,107,790

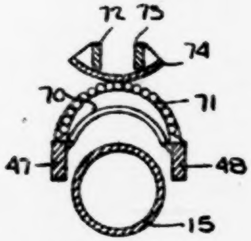
CARGO RIG

Filed Dec. 6, 1960 4 Sheets-Sheet 4



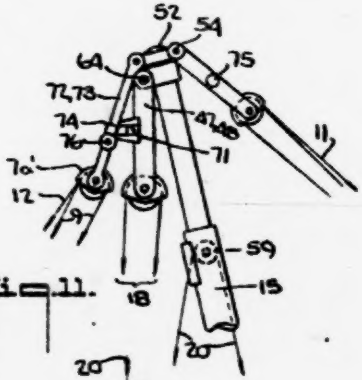
47,48
59
20
33
8
18
15'
12
78
80
61
60
60a
69
4'
3'
65
81
67
68
20
62

Fig.10.



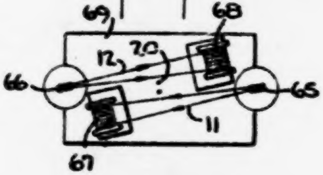
72
73
74
70
71
47
48
15

Fig.12.



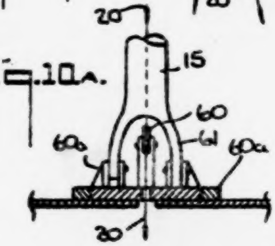
52
54
64
75
72,73
47,48
74
76
71
11
70'
12
59
15
18
20

Fig.11.



69
68
12
20
66
65
11
67

Fig.13.



20
15
60
60a
61
60a
30

Fig.10a.

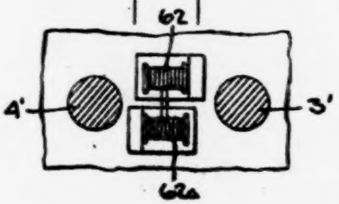


Fig.14.

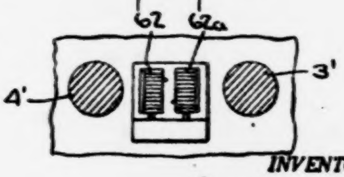


Fig.15.

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United States Patent Office

3,107,790

Patented Oct. 22, 1963

3,107,790

CARGO RIG

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Filed Dec. 6, 1960, Ser. No. 74,190
17 Claims. (Cl. 212—3)

The present invention relates to improvements in cargo rigs, particularly for cargo rigs mounted on ships.

It has already been proposed to use a single cargo boom servicing two hatches by shifting the boom through the transverse plane defined by two kingposts to which the topping lift gears of the boom are attached. This known boom has a fork structure at its head, which holds the hoisting gear while the boom is swung from hatch to hatch and thus avoids the necessity of dismantling the hoisting gear and then reassembling it when the boom has been positioned over the other hatch. This fork structure, however, is rather expensive and the preparations for shifting the boom from hatch to hatch are time-consuming.

It is the primary object of the present invention to produce a simpler and faster working single two-hatch boom.

It is another object to provide such an improved two-hatch boom while making use of standard blocks and gears.

It is also an object of this invention to provide a novel mounting for the hoisting and topping lift gears of the boom.

It is a further object of the invention to provide an improved kingpost structure of two-hatch cargo rigs.

The above and other objects and advantages are accomplished in accordance with the invention by mounting a freely rotatable topping lift gear attaching means on the boom head, the topping lift gear means being attached to the freely rotatable attaching means on the boom head and preferably also freely rotatable attaching means on the kingposts of the cargo rig, respectively. The heel of the boom is universally mounted so that the boom may be shifted fore and aft as well as laterally in relation to the kingposts by the topping lift gear means. A hoisting gear is preferably pivotally suspended from the boom head and a hoisting gear lead line runs over a guide block at the heel of the boom to a hoisting winch which is positioned laterally offset from the longitudinal center plane of the rig in the plane of the kingposts. The hoisting gear is swung through a free space between the boom and the adjacent kingpost opposite the position of the hoisting winch or on the same side thereof. In this manner, all running gears remain unchanged in their relative position to the boom, kingposts and winches while the boom is shifted from hatch to hatch.

In accordance with one embodiment of the invention, the kingposts are of tripod structure and arranged in a transverse plane on the port and starboard side of the ship.

According to a preferred embodiment, the hoisting gear is freely swingably suspended from the boom head by means of link elements of sufficient length and width to permit shifting of the boom without interference from the suspended hoisting gear.

With this cargo rig, the topping lift gears alone are used for shifting of the boom and the hoisting gear remains idle during the shifting operation. Immediately after shifting is completed, the hoisting gear is ready for operation over the other hatch and no hoisting or overhead shifting of the hoisting gear is required before shifting or lowering of the gear after shifting.

The above and other features of the invention will become more apparent in the following detailed description of certain now preferred embodiments thereof, taken in conjunction with the accompanying drawing wherein

FIG. 1 is a perspective view of one embodiment of a cargo rig according to the invention;

FIG. 2 is a schematic perspective view of a modification of the cargo rig of FIG. 1;

FIG. 3 is a front view of another modification of a cargo rig;

FIG. 3*a* shows a modified detail of FIG. 3.

FIG. 4 is a schematic side view of a group of cargo rigs arranged on a ship;

FIG. 5 is a top view of FIG. 4;

FIG. 6 is a vertical cross section showing one embodiment of the rotatable boom head of the invention;

FIG. 7 is a side view of FIG. 6;

FIGS. 8 and 9 are cross sections similar to FIG. 6 but showing two modifications of the rotatable boom head;

FIG. 10 is a front view of another modification of a cargo rig;

FIG. 10*a* is an enlarged view of the boom heel of the boom of FIG. 10;

FIG. 11 is a side view of one embodiment of the means for attaching the topping lift gears and the hoisting gear to the boom head;

FIG. 12 is a horizontal cross section showing a detail of FIG. 11;

FIG. 13 is a top view showing an arrangement of the topping lift winches of FIG. 10; and

FIGS. 14 and 15 are top views showing alternate arrangements of the hoisting winches of FIG. 10.

Referring now to the drawing and more particularly to FIG. 1, one embodiment of the cargo rig of the present invention is shown mounted on a barge or ship 1. The ship carries a cargo boom supporting platform or table 2 which, in the illustrated embodiment, rests on legs 5 whereby a free space is defined between the ship deck and the platform 2. Hatches 22 and 23 are arrange fore and aft of platform 2. If desired, the entire cargo rig may be shiftable between the hatches and, for this purpose, means for moving the cargo boom supporting platform in relation to the hatches may be provided. As shown, the platform legs are mounted on tracks 6 running substantially parallel to the hatches so that the cargo rig may be moved closer to one or the other hatch.

The single cargo boom 15 has a top and a heel, the heel of the boom being universally mounted on the platform 2 for free longitudinal and lateral pivoting movement in relation to the hatches and the transverse plane defined by the kingposts. In the embodiment of FIG. 1, the universal mounting for the heel of the boom consists of a transverse pivot 16 mounted on a freely rotatable support.

As shown in FIG. 1, I prefer to use tripod kingposts 3, 4, the respective kingposts consisting of outboard legs 3*a*, 3*b* and 4*a*, 4*b*, and inboard legs 3*c* and 4*c*. Freely rotatable elements 7 and 8 are mounted at the tops of kingposts 3 and 4, respectively, topping lift blocks 7*a* and 8*a* being attached to these rotatable elements for free rotation in relation to the kingposts. The topping lifts 9 and 10 lead from the topping lift blocks 7*a* and 8*a* to the topping lift blocks 7*a'* and 8*a'* at the top of the boom whence lead lines 11 and 12 lead to winding drums 13 and 14 of the topping winch. The topping lift gear is attached to a rotatable top head 17 of the boom, which will be described in more detail hereinafter, together with the hoisting gear 18 suspended from elements 47, 48.

The cargo rig is illustrated in full lines in FIG. 1 in operational position above hatch 22 while its position above hatch 23 is indicated schematically and partially in broken lines in this figure.

FIG. 2 schematically shows a cargo rig identical in all respects with that of FIG. 1, except that the position of the legs of tripod kingposts 24 and 25 is reversed, i.e. the kingposts have a single outboard leg 24*a* and 25*a*, respectively, and two inboard legs 24*b*, 24*c* and 25*b*, 25*c*. Also, in this embodiment, the kingposts and the cargo boom 15 are mounted directly on ship deck 26 which serves as their supporting platform. Furthermore, light booms 27 and 28 are pivotally mounted on the kingposts.

The advantages of using tripod kingposts instead of the conventional, conically-shaped, heavy kingposts are manifold. The latter are expensive to manufacture while tripod kingposts may be made simply by welding together standard tubular members available at a fraction of the cost. Furthermore, a split topping lift gear, which does away with special vang ropes and vang winches, requires considerable spreading of the kingpost tops to limit the forces of the topping lift gear. Therefore, kingposts for heavy cargo rigs operating with a split topping lift gear have been arranged obliquely.

With the cheaply manufactured tripod kingposts, the tops on the port and starboard side may be positioned readily as far from the longitudinal center plane of the rig as possible without difficulty. As a matter of fact, the spreading of the tops of the kingposts almost to the full width of the ship may be readily obtained with a tripod structure, merely a small inboard-directed inclination of the outer member or members of the tripod being provided to take into consideration a possible list of the ship while moored at a pier.

Another advantage of the tripod kingposts resides in the smaller deck area required for their foundation, compared to the conventional conical kingposts. Conical kingposts for a heavy rig, say 150 tons capacity, require a foundation area with a diameter of about nine to ten feet at the deck level. Similar tripod kingposts would require only about three foundation areas of 30" each for the three tripod elements, leaving a free deck area for deck cargoes, particularly if one element is arranged outside and two tripot elements inboard, as in FIG. 2.

As shown in FIGS. 1 and 3, the hoisting gear 18, which comprises a block and cargo hook, is swingably suspended from the top of the boom by a pair of link elements 47, 48 which are pivoted to the top of boom 15, hoisting lead line 20 leading from the hoisting gear 18 over cheek block 20*a*, which is supported on the boom near the top to a guide block 19 near the heel of the boom whence it is directed to winding drum 21 of the hoisting winch. As seen in the drawing, the boom is pivotally mounted in relation to the two transversely arranged kingposts in a longitudinal plane centrally intersecting the plane of the kingposts and the hoisting winch 21 is mounted laterally offset from this center plane of the cargo rig in the plane of the kingposts.

While the guide block 19 for the hoisting lead line 20 is shown in the modification of FIG. 3 arranged at one side of the boom in such a manner that the boom will be shifted from hatch to hatch opposite to the side where the hoisting winch 21 is placed, FIG. 3 shows a similar guide block 19*a* arranged at the boom heel at the opposite side of the boom whereby the boom is shifted laterally at the same side as the position of the hoisting winch. In all other respects, the partial showing of the boom of FIG. 3*a* is identical with that of FIG. 3.

As is best seen in FIGS. 3 and 3*a*, boom 15 may be hauled from one hatch to the other through the transverse plane defined by the kingposts by so operating the topping lift gear that the hoisting gear 18 passes through the free space 31 or the free space opposite thereto between the boom and an adjacent kingpost during the shifting of the boom. For this purpose, both topping lift gears haul the boom in a plane of about 85° elevation and about 5° elevation before the dead center point the boom is shifted laterally by hand or by an electric hydraulic device 30 acting on the pivoting means at the boom heel and turned opposite to the side on which the hoisting winch is mounted when the guide block at the heel is mounted on the upper side of the heel or turned to the side on which the winch is mounted when the guide block for the lead line is mounted at the lower side of the boom heel. During this shifting operation the boom is held by one side of the topping lift gear while the other side of the topping lift gear is slack during the shifting of the boom over the dead center angle. In this manner, the cargo boom will be raised and shifted, being pivoted about pivot means 16 out of the central plane as it passes through the transverse plane of the kingposts.

Since the hoisting gear 18 swings freely and without obstruction from the top of the boom wherefrom it is suspended by pivotally mounted link elements 47, 38, it will freely pass through the unobstructed space 31 defined by the boom and an adjacent kingpost. The guide block 19 near the heel of the boom, which guides the hoisting lead line 20 to winch 21, is rotatably mounted on the boom so that it turns with the boom as the latter is shifted and thus maintains its proper guidance function for the lead line.

As shown in FIG. 3, topping lift lead lines 11 and 12 may be guided over cheek blocks 33 and 32 to the winding drums 13 and 14. The boom supporting platform 2 is preferably braced by vertical supports or columns 34, 35, 36 and the latter may be so spaced as not to interfere with cargo containers 37 carried on the deck.

As the side and top views, respectively, of FIGS. 4 and 5 schematically indicate, the cargo rigs may be arranged in groups, two booms 15, 15*b*, for example, serving four hatches 38, 39, 40 and 41.

The rotatable boom head 17 will now be more fully described in connection with FIGS. 6 and 7. In the embodiment herein shown, the hollow head of boom 15 carries an annular support having a generally frusto-conical bearing face 46*a* supporting a correspondingly frusto-conical portion of a center piece 42 for free rotation. The center piece is mounted on anti-friction bearing means, roller bearings 43 and 44 serving to balance the moment and roller bearing 45 serving to transfer the axial forces. The freely rotatable center piece has eyes 49 and 50 for attachment of the topping lift gears.

Bolts 46 are mounted at the head of the boom to serve as pivotal attachment means for the links 47, 48 upon which the hoisting gear 18 is suspended for free swinging movement in relation to the boom. For this purpose, the spacing 51 of the links is sufficient to provide clearance for the boom when the same is shifted.

A modified embodiment of the rotatable boom head is illustrated in FIG. 8. In this modification, a bearing block 46*b* is fixedly mounted in the hollow head of boom 15, a support bolt 46' for the hoisting gear suspension links passing through the boom and the support block. The support block has a cylindrical bearing surface 46*b'* supporting a correspondingly cylindrical portion of a rotatable cap 52 for free rotation. Roller bearings 43', 44' and 45' are similar in structure and function to the like anti-friction bearing means in FIG. 6. The topping lift gears are attached to the rotatable cap by a pair of eyes which may extend laterally, as shown at 54 in full lines, or upwardly, as shown at 53 in broken lines.

Still another modification of the rotatable boom head is illustrated in FIG. 9. Here the eyes 55, 56 for attachment of topping lift gears 9 and 10 are independently mounted on a rotatable member comprising eyebolt support plates 57 and 58. The member is mounted for free rotation in bearing sleeve 46c, friction bearings being provided similarly to the embodiments of FIGS. 6 and 8, as shown. A transverse belt 46'' again provides pivotal support for the hoisting gear suspension links.

It will be obvious that all three illustrated embodiments of the rotatable boom head provides freely rotatable means for attachment of the topping lift gears. Also, in all three embodiments, means is provided for suspending the hoisting gear for free swinging movement from the boom head.

The cargo rig shown in FIG. 10 differs somewhat from that of FIGS. 1 and 3 but to simplify the understanding and description thereof, like parts thereof have been designated by identical reference numerals. In this embodiment, the single two-hatch boom of the present invention has been combined with conventional kingposts, the only requirement being that the spacing between the boom and at least the upper portions of the kingposts are sufficient to permit free passage of the hoisting gear as the boom is shifted from hatch to hatch.

In the illustrated embodiment, the kingposts are generally conically upwardly tapering uprights 3' and 4' which are outwardly inclined from the center plane of the rig wherein the boom 15' is pivotally mounted.

The hoisting lead line 20 is guided from the hoisting gear 18 over cheek block 59 mounted inside hollow boom 15', downwardly through the hollow boom over centrally aligned guide block 60 to hoisting winch 62. In the case of heavy rigs, two hoisting lead lines are provided and are then led to two winches 62 and 62a. As shown in FIGS. 14 and 15, respectively, the axes of the hoisting winch or winches may either extend transversely, i.e. parallel to the plane defined by the kingposts, or longitudinally, i.e. parallel to the center plane of the rig which is perpendicular to the plane defined by the kingposts.

As most clearly shown in the enlarged illustration of FIG. 10a, the guide block 60 is mounted on disc 60a which constitutes a freely pivotal or rotatable mounting means for the boom so that the guide block 60 turns with the boom. Disc 60a is mounted for free rotation in a bearing ring 60a' which is fixedly carried by the deck or platform supporting the boom. The hoisting winch or winches are generally vertically below the guide block 60 and the disc 60a has a central passageway permitting the lead line 20 to be guided therethrough to the winch or winches.

The heel of boom 15' is forked, legs 61 of the boom heel being rigidly secured to the rotatable discs 60a on brackets 61a which constitute a pivotal mounting for the boom whereby the boom may be shifted from one hatch to the other about its pivotal mounting, while the disc is simultaneously freely rotated. Thus, the rotatable disc 60a and the pivotal mounting 61a constitute a universal mounting for the heel of the boom, functionally similar to the embodiment of FIG. 1.

Since the guide block 60 is centered in the space defined by the forked heel of the boom, the lead line 20 will always remain properly guided, regardless of the elevation and outreach of the boom.

The hoisting and topping lift gears are generally like those of the embodiments of FIGS. 1 and 3, wherefor they will be no further described, except in respect of structural differences noted hereinbelow.

The topping lift lead lines 11 and 12 are guided over top cheek blocks 32 and 33 as well as lower cheek blocks 65 and 66 to the topping lift winches 67 and 68 within the deck house 69, which supports the boom, special supports 81 for rotatable disc 60a being shown at 81. The relative positions of the topping lift winches are shown in the top view of FIG. 13 which shows the hoisting lead line 20 to pass centrally between the topping lift lead lines 11 and 12 so that there is no interference between these lines.

A preferred means for attaching the topping lift gears and the hoisting gear to the head of the boom is illustrated in FIGS. 11 and 12, the rotatable boom head used for purposes of illustration being the rotatable cap 52 with its eyes 54, as shown and described more fully in connection with FIG. 8.

In the illustrated modification herein shown, the hoisting gear 18 is eccentrically mounted on the boom, which produces a considerable counter-moment enabling the boom to be constructed with about 20% lighter weight than would otherwise be required for the same hoisting capacity. The eccentric attachment of the hoisting gear links 47, 48 to the boom head produces a moment counteracting the moment set up by the topping lift gear on the boom. For this purpose, the boom head is provided with a collar 63 carrying a bolt 64 which provides a pivotal mounting for the links 47, 48 in a manner similar to bolt 46 described hereinabove in connection with other figures of the accompanying drawing.

Whether the hoisting gear suspension links are eccentrically mounted on the boom head or not, the two links are connected by an arcuate cross-piece 70 which carries an anti-friction roller supported band 71. The topping lift blocks 7a' and 8a' are attached to the eyes 54 of the rotatable boom head by means of pairs of links 72, 73. Those topping lift gear suspension links which are adjacent the hoisting gear are inter-connected by an arcuate shield member 74 (see particularly FIG. 12). Spacing members 70 and 74 provide adequate clearance between this topping lift gear and the hoisting gear, frictionless passing of the links 72, 73 of the topping lift gear being ensured by the cooperation between the band 71 and smooth shield 74.

The topping lift gear attachment links 72, 73 have swivel joints 74 and 75 to provide suitable self-adjustment of the topping lift gear when the boom is shifted into a desired position over the side, fore or aft.

In broken lines, FIG. 10 also shows light booms 79 and 80 attached to the kingposts, outriggers 77 and 78 being mounted on the kingposts for their topping lift gears in a manner similar to that shown in FIG. 2 in connection with tripod kingposts.

As will be obvious, the hoisting and/or the topping lift winches may be placed at any desired location, for instance below deck in a protected space, the topping lift lead lines being guided through the open space defined by the legs of the tripod kingposts or through the center of the tubular members forming these legs or the kingposts themselves, as in FIG. 10. In the same manner, the hoisting lead lines may lead through the center of the tubular member forming the boom.

While the invention has been described and illustrated in connection with certain preferred embodiments, it will be understood that many variations and modifications may occur to the skilled in the art, particularly after benefiting from the present teaching, without departing from the spirit and scope of this invention as defined in the appended claims.

What is claimed is:

1. A cargo rig comprising two kingposts; a boom between said kingposts, said boom having a heel and a head; a universal mounting means for the boom heel whereby said boom may be shifted fore and aft as well as laterally in relation to said kingposts; topping lift gear means for shifting said boom; a freely rotatable topping lift gear attaching means mounted on the boom head, the topping lift gear means being attached to the said attaching means and to the kingposts, respectively; a hoisting gear; means for pivotally suspending the hoisting gear from the boom head; a lead line for said hoist-

ing gear; a hoisting winch for said lead line; and guide block means mounted, respectively, near the head and the heel of the boom for rotation with the boom, the guide block means guiding the lead line from the hoisting gear along the lentgh of the boom to the winch.

2. The cargo ring of claim 1, wherein said kingposts are of tripod structure.

3. The cargo ring of claim 1, wherein said kingposts are conically upwardly tapering uprights outwardly inclined from said boom.

4. The cargo rig of claim 1, further comprising freely rotatable topping lift gear attaching means mounted on the kingposts, the topping lift gear means being attached to said attaching means.

5. The cargo rig of claim 1, wherein the pivotal suspending means comprises a pair of links having a clearance therebetween at least equal to the diameter of the boom head.

6. A cargo rig for a ship having a deck comprising a supporting platform for the rig; a plurality of upright supports mounting the platform on the deck whereby free cargo space is defined between the deck and the platform; two kingposts mounted on the platform; a boom mounted on the platform between said kingposts, said boom having a heel and a head; a universal mounting means for the boom heel whereby said boom may be shifted fore and aft as well as laterally in relation to said kingposts; topping lift gear means for shifting said boom; a freely rotatable topping lift gear attaching means mounted on the boom head, the topping lift gear means being attached to the said attaching means and to the kingposts, respectively; a hoisting gear; means for pivotally suspending the hoisting gear from the boom head; a lead line for said hoisting gear; a hoisting winch for said lead line; and guide block means mounted, respectively, near the head and the heel of the boom for rotation with the boom, the guide block means guiding the lead line from the hoisting gear along the length of the boom to the winch.

7. The cargo rig of claim 6, further comprising means for moving said platform.

8. A cargo rig comprising two kingposts; a hollow boom between said kingposts, said boom having a heel and a head; a universal mounting means for the boom heel whereby said boom may be shifted fore and aft as well as laterally in relation to said kingposts, said universal mounting means including a freely rotatably mounted boom support and means for pivotally mounting the boom heel on the support; topping lift gear means for shifting said boom; a freely rotatable topping lift gear attaching means mounted on the boom head, the topping lift gear means being attached to the said attaching means and to the kingposts, respectively; a hoisting gear means for pivotally suspending the hoisting gear from the boom head; a lead line for said hoisting gear; a hoisting winch for said lead line; and guide block means mounted, respectively, near the head and the heel of the boom for rotation with the boom, the guide block means guiding the lead line from the hoisting gear along the length of the boom to the winch.

9. The cargo rig of claim 8, wherein the boom heel is a forked structure having two legs defining a free space therebetween, said two legs being pivotally mounted on the support and one of said guide block means for the hoisting gear lead line being fixedly mounted in said free space on the support, the lead line passing through the hollow boom to said latter guide block means and then through a passageway in said boom support, and the hoisting winch being positioned below said support to receive the hoisting lead line from the guide block.

10. A cargo rig comprising two kingposts; a boom between said kingposts, said boom having a heel and a head; a universal mounting means for the boom heel whereby said boom may be shifted fore and aft as well as laterally in relation to said kingposts, two topping lift gears for shifting said boom; freely rotatable topping lift gear attaching means mounted, respectively, on the boom head and on the two kingposts; means for attaching each topping lift gear to the freely rotatable topping lift gear attaching means on the boom head and to a respective one of the freely rotatable topping lift gear attaching means on the two kingposts; topping lift lead lines attached to each of said topping lift gears; a topping lift winch means for each of said lead lines; a guide block guiding each of said topping lift lead lines to said topping lift winches; a hoisting gear pivotally suspended from the boom head; a lead line for said hoisting gear; a hoisting winch for said lead line, and guide block means mounted, respectively, near the head and the heel of the boom for rotation with the boom, the guide block means guiding the lead line from the hoisting gear along the length of the boom to the winch.

11. The cargo rig of claim 10, wherein the guide blocks for said topping lift lead lines are mounted atop a respective one of said freely rotatable topping lift gear attaching means on the two kingposts.

12. The cargo rig of claim 10, further comprising means mounting the winches in a protected space and additional guide blocks for the topping lift lead lines for guiding said lines to the protected topping lift winches.

13. A cargo rig comprising two kingposts; a boom between said kingposts, said boom having a heel and a head; a universal mounting means for the boom heel whereby said boom may be shifted fore and aft as well as laterally in relation to said kingposts; two topping lift gears for shifting said boom; each topping lift gear including a pair of topping lift blocks, one of the blocks of each pair being attached to a respective one of said kingposts; a freely rotatable member mounted on the boom head; link means for attaching the other block of each pair to said rotatable member; a hoisting gear suspended from the boom head; a pivot mounted on the boom head; link means having a clearance therebetween at least equal to the boom head diameter and attached to the pivot and carrying the hoisting gear; an arcuate spacer member mounted on the hoisting gear link means; and an arcuate spacer member mounted on the link means of at least one of said topping lift gears, said spacer members cooperating to provide clearance between said link means upon shifting of the boom.

14. The cargo rig of claim 13, further comprising antifriction means on at least one of said spacer members for providing substantially friction-less contact between said spacer members.

15. A cargo rig comprising two kingposts; a boom between said kingposts, said boom having a heel and a head; a universal mounting means for the boom heel whereby said boom may be shifted fore and aft as well as laterally in relation to said kingposts; two topping lift gears for shifting said boom; freely rotatable topping lift gear attaching means mounted, respectively, on the boom head and on the two kingposts; means for attaching each lift gear to the freely rotatable topping lift gear attaching means on the boom head and to a respective one of the freely rotatable topping lift gear attaching means on the two kingposts; topping lift lead lines attached to each of said topping lift gears; a topping lift winch means for each of said lead lines; a guide block guiding each of said topping lift lead lines to said topping lift winches; a hoisting gear; means for pivotally suspending the hoisting gear from the boom head; pivot means fixedly and eccentrically mounted on said boom between the longitudinal axis of the boom and the hoisting gear for mounting the suspending means on the boom; a lead line for said hoisting gear; a hoisting winch for said lead line; and guide block means mounted, respectively, near the head and the heel of the boom for rotation with the boom, the guide block means guiding the lead line from the hoisting gear along the length of the boom to the hoisting winch.

16. The cargo rig of claim 15, wherein the hoisting winch is positioned laterally offset from the longitudinal center plane of the rig.

17. The cargo rig of claim 15, wherein the hoisting winch is positioned below the universal mounting means of the boom heel.

References Cited in the file of this patent

UNITED STATES PATENTS

2,613,001 Green ------------------ Oct. 7, 1952
2,914,193 Kohnenkamp et al. ------ Nov. 24, 1959

FOREIGN PATENTS

937,992 Germany --------------- Jan. 19, 1956
1,020,544 Germany ------------- Dec. 5, 1957

OTHER REFERENCES

Motorfrachtschiff "Lichtenfels," from Schiff and Hafen, November 1954, CD. Heydorns, Uetersen, near Hamburg.

APPENDIX K

Lehmann's '222 Patent

(PHOTOSTATS)

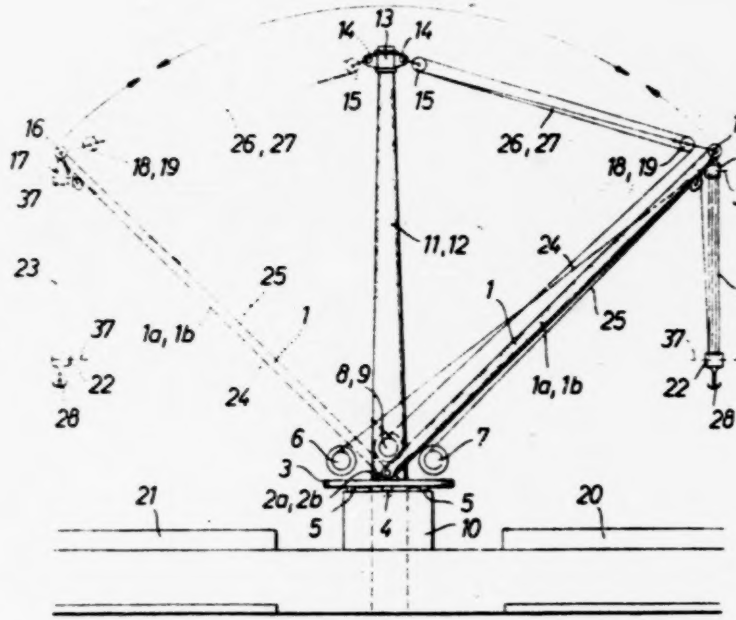
(See opposite ☛)

July 3, 1962 G. W. LEHMANN 3,042,222

CARGO BOOM

Filed April 13, 1959 3 Sheets-Sheet 1

FIG. 1



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July 3, 1962 **G. W. LEHMANN** 3,042,222

CARGO BOOM

Filed April 13, 1959 3 Sheets-Sheet 2

FIG. 2

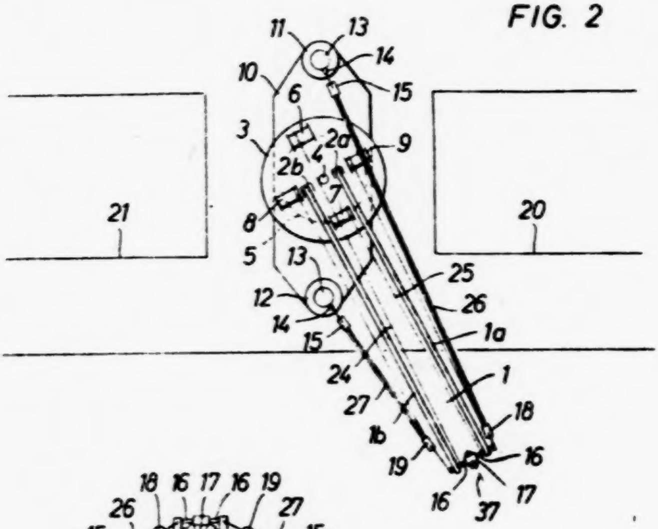
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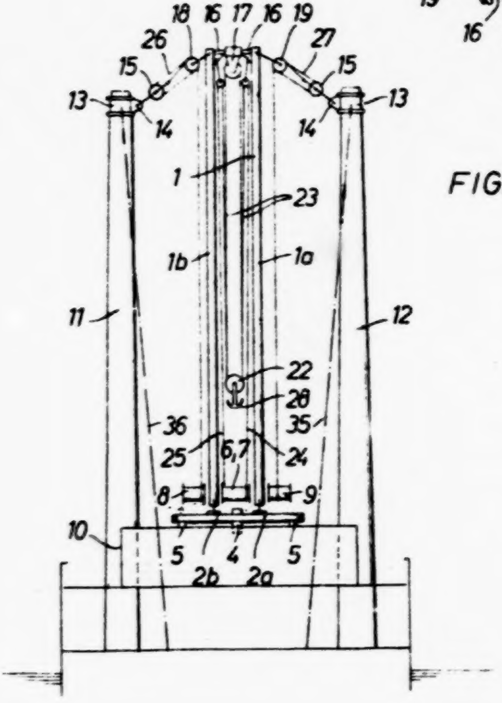
FIG. 3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CARGO BOOM

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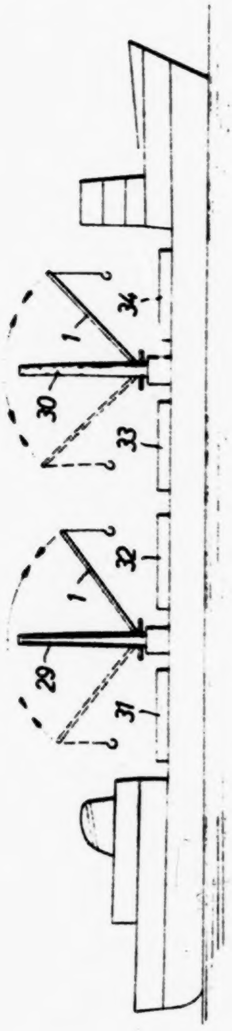
FIG. 4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United States Patent Office

3,042,222

Patented July 3, 1962

3,042,222

CARGO BOOM

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Filed Apr. 13, 1959, Ser. No. 806,124
8 Claims. (Cl. 212—3)

The present invention relates to improvements in cargo hoisting means and, more particularly, to a cargo boom mounted on a ship and adapted to serve more than one hatch.

There have been increasing demands for heavy lift rigs on freighters for hoisting individual heavy loads into and out of the cargo space. Such heavy lift gear requires a heavy boom in conjunction with heavy and expensive winches and auxiliary equipment. If such heavy cargo booms serve only a single hatch, the operation is highly uneconomical since it requires separate expensive hoisting equipment for each hatch.

In an effort to increase the efficiency of heavy topping lift equipment aboard ships, it has been proposed to mount a single heavy boom between two kingposts erected between two adjacent hatches and to swing the boom through the kingposts from one hatch to the other. However, the known equipment of this type has required special means for shifting the blocks of the hoist gear, dismantling and reassembly of the hoisting leads, blocks and other rig parts, all of which involves a waste of time and increases the unproductive harbor days of a freighter.

It is the principal object of the present invention to overcome the latter disadvantages and to produce a cargo boom which can be swung between adjacent hatches without special shifting devices or dismantling of any parts.

The boom according to the present invention resembles a gallows and has two legs through which the hoisting gear may freely swing when the boom is pivoted between two kingposts to extend over respective ones of adjacent hatches. According to one feature of the present invention, a crosspiece is mounted between the boom legs at their top to support an upper hoisting block or its links, sufficient clearance being provided between the legs to permit the upper and lower hoisting blocks of the hoisting gear to pass therethrough to extend on one or the other side of the boom. The hoisting leads are so arranged on the blocks and their drums that they remain thereon during the shifting-over and in no way interfere with the blocks or with the hoisting leadlines while the position of the boom is changed from one hatch to the other.

In accordance with another feature of this invention, the topping lift blocks for lowering and raising the boom are secured respectively to the tops of the two kingposts and to the upper ends of the gallows boom. The lift blocks which are attached to the kingposts are self-adjusting to any direction in which the boom may be positioned by providing a universal mounting of the blocks on the kingposts. This mounting may take the form of a ring supported on the kingposts by means of roller bearings and provided with a lug for the attachment of the topping lift blocks. In this manner, the lift blocks may freely follow any movement of the gallows boom.

According to another feature of the present invention, the boom is pivoted to an oscillatory turntable which also carries the winches for the hoisting gear and for raising and lowering the boom. In this arrangement, the hoisting and lifting ropes always remain on their drums and blocks, regardless of the working position of the gallows boom, only one set of winches being required for operation of the boom over two adjacent hatches. The hoisting leadlines are attached to the sides of the hoisting blocks and positioned close to each leg

of the gallows boom on their passage to the winches on the turntable so that the blocks may freely pass through the legs when the boom is shifted from one hatch to the other. The topping lift leadlines are attached to the top of the legs at their outsides so that they never interfere with the hoisting leadlines, regardless of the position of the boom.

The boom is lifted and eventually turned from one hatch to the other by adjusting the length of the topping lift leadlines. If the length of the two topping lift leadlines is varied independently from each other, the elevation and the outreach of the boom will be adjusted in any desired position. Actuation of one or the other topping lift leadline produces a pull on the boom which will be translated into a turning moment on the turntable so that the latter requires no separate drive for oscillation. The turntable, which supports the boom and its winches, turns automatically under the influence of the shortening and corresponding slackening of the two lifting leadlines.

The above and other features of the present invention will be more fully described in the following detailed description of a preferred embodiment, taken in conjunction with the accompanying drawing wherein

FIG. 1 is a side elevation of the cargo boom and showing the single boom positioned in opposite, alternative directions;

FIG. 2 is a top view of the boom;

FIG. 3 is a front view of the boom during the operation of shifting it from one hatch to the other; and

FIG. 4 is a side view of a freighter with two cargo booms serving four hatches.

Referring now to FIGS. 1 to 3, the gallows boom 1 is shown to have two legs 1*a* and 1*b* pivoted on turntable 3 by brackets 2*a* and 2*b*. Deckhouse 10 carries pivot 4 for oscillatory support of the turntable and ring 5 for maintaining the turntable in horizontal position during its rotation. Kingposts 11 and 12 are mounted at the respective ends of the deckhouse and carry on top rings 13 to which the upper topping lift blocks 15 of the boom 1 are attached. Rings 13 are freely rotatably mounted on the kingposts, for instance, by means of roller bearings, and have lugs 14 which permit the blocks 15 to be secured to the rings.

As best shown in FIGS. 2 and 3, a crosspiece 16 interconnects the upper ends of legs 1*a* and 1*b* and serves to support the upper hoisting block 17 or link supports for the upper hoisting block. Topping lift blocks 18 and 19 are attached to the outsides of the boom legs at or near their upper ends.

The hoisting gear 23 is mounted on the upper hoisting block 17 and carries lower hoisting block 22, the entire hoisting assembly being accommodated between the boom legs and free to swing therethrough when the boom is shifted over from hatch 20 to hatch 21, or vice versa. Hoisting winches 6 and 7 are so arranged on the turntable that the hoisting leadlines 24 and 25 are close to the insides of the boom legs, leaving ample clearance for passage of the hoisting gear 23 with blocks 17 and 22.

When the boom is to be shifted from one hatch to the other, topping lift leadlines 26, 27 will first be shortened by operating lifting winches 8 and 9. After the boom passes between the kingposts, the topping lift leadlines will be slackened again until the boom has reached the desired position over the other hatch. The dead point of the boom, when it is in a vertical or nearly vertical position, may be overcome by applying a special rope pull on hook 28 of block 22 or by any other suitable means which will push or pull the boom across the dead point.

It is obvious from the above description that the boom of the present invention may be shifted from hatch to hatch without disconnecting any ropes or dismantling any parts, the boom being immediately ready for a loading or unloading operation upon completion of the shifting.

Independent operation of winches 8 and 9 results in a selective slackening and/or shortening of leadlines 26 and 27 with a corresponding change in the position of boom 1.

Additional deck space close to the deckhouse may be provided by mounting the kingposts 11, 12 with an upward slope, as shown by lines 35 and 36 in FIG. 3, the lower ends of the kingposts being closer together while their tops are spread apart to permit swinging of the gallows boom over the side as far as possible.

The axes 37 of the hoist blocks 17 and 22 are transverse to the plane defined by the boom legs to prevent jamming of the hoisting leadlines 24, 25 with the hoisting gear 23 and to direct the hoisting leadlines properly to the winches in either location of the boom 1 over hatch 20 or hatch 21. This is contrary to the conventional arrangement wherein the axes of the hoisting blocks are transverse to the axis of the boom.

FIG. 4 schematically shows a cargo ship with four hatches 31, 32, 33, 34 and two heavy lift rigs 29, 30 mounted between adjacent hatches.

The gallows boom has been described and illustrated with the winches mounted on a turntable with the boom. However, it may also be used in combination with winches mounted on a fixed platform. In this case, check blocks are required to direct the hoist and lift leadlines properly on the winches.

While the invention has been described in connection with a single embodiment, it will be obvious that many changes and modifications in structural details may occur to the skilled in the art, particularly after benefiting from the present teaching, without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A cargo lift gear comprising two kingposts, a boom consisting of two legs, pivotal bearing means connected to the lower ends of the boom legs and mounting the boom for pivotal movement between said kingposts, and to either side of the plane defined by the kingposts, a load-bearing crosspiece connecting the upper ends of the boom legs, a hoisting gear including upper and lower hoisting block means, the upper hoisting block means being supported by said crosspiece substantially midway between the boom legs and the two boom legs defining an unobstructed clearance to permit the hoisting gear to pass between the legs, and topping lift blocks attached to the upper ends of the boom legs at their outsides and to the kingposts for controlling the position of the boom.

2. A cargo lift gear comprising two kingposts, a boom consisting of two legs, pivotal bearing means connected to the lower ends of the boom legs and mounting the boom for pivotal movement between said kingposts and to either side of the plane defined by the kingposts, a hoisting gear including upper and lower hoisting block means, a load-bearing crosspiece connecting the upper ends of the boom legs and supporting the upper hoisting block means substantially midway between the boom legs, the two boom legs defining an unobstructed clearance to permit the hoisting gear to pass between the legs, first winch means in alignment with the boom, hoisting leadlines wound on the winch means and attached to the upper hoisting block means for lowering and raising the hoisting gear upon operation of the winch means, the hoisting leadlines being arranged between the boom legs and the hoisting gear to leave said clearance unobstructed, topping lift means including topping lift block means attached respectively to the outsides of the upper ends of the boom legs and to the upper ends of the kingposts, second winch means mounted adjacent and outside the boom legs and topping lift leadlines wound on the second winch means and attached to the topping lift blocks which are attached to the upper ends of the boom legs for raising and positioning the boom upon operation of the second winch means.

3. The cargo lift gear of claim 2, further comprising a turntable freely rotatably mounted for oscillatory movement between the kingposts and carrying the pivotal bearing means for the boom legs and the winch means.

4. The cargo lift gear of claim 3, comprising universally mounted means for attaching the topping lift block means to the upper ends of the kingposts.

5. The cargo lift gear of claim 2, wherein the axes of the hoisting block means are transverse to the plane defined by the boom legs.

6. The cargo lift gear of claim 2, further comprising a turntable freely rotatably mounted for oscillatory movement between the kingposts and carrying the pivotal bearing means for the boom legs and the winch means, the second winch means consisting of two independent winches positioned at each side of the boom.

7. A cargo lift gear comprising a boom consisting of two legs and a load-bearing crosspiece connecting the upper ends of the boom legs, an oscillatory turntable pivotally mounting the boom, a hoisting gear mounted on the crosspiece of the boom, a topping lift means attached to the upper end of the boom and to two fixed points, respectively, said two fixed points and the pivotal mounting of the boom defining a plane, hoisting winches and topping lift winches mounted on the turntable, hoisting leadlines wound on the hoisting winches and attached to the hoisting gear, topping lift leadlines wound on the lifting winches and attached to the topping lift means, the winches being so positioned that the hoisting and lifting leadlines do not interfere with each other during positioning movement of the boom, the turntable being oscillated automatically upon independent operation of respective ones of said lift winches to shorten one of said topping lift leadlines while the other one is correspondingly slackened, and the hoisting leadlines being so attached to the hoisting winches that they emerge from the lower side of the winches when the boom is pivoted to one side while they come from the upper side of the winches when the boom is pivoted to the opposite side.

8. A cargo lift gear comprising two kingposts, a boom between said kingposts, a turntable pivotally mounting the boom and mounted for free oscillation between the kingposts, topping lift block means attached respectively to the boom and to each of the said kingposts, and winch means including topping lift leadlines attached to the topping lift blocks for raising the boom and for oscillating the turntable so as to position the boom upon operation of the winch means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,562,086	Farrell ----------------	July 24, 1951

FOREIGN PATENTS

766,718	Great Britain ------------	Jan. 23, 1957

APPENDIX L

Sparrow's '403 Patent

(PHOTOSTATS)

(See opposite ☛)

Nov. 12, 1963 W. T. SPARROW ETAL 3,110,403

CARGO HANDLING APPARATUS

Filed Jan. 31, 1962 4 Sheets-Sheet 1

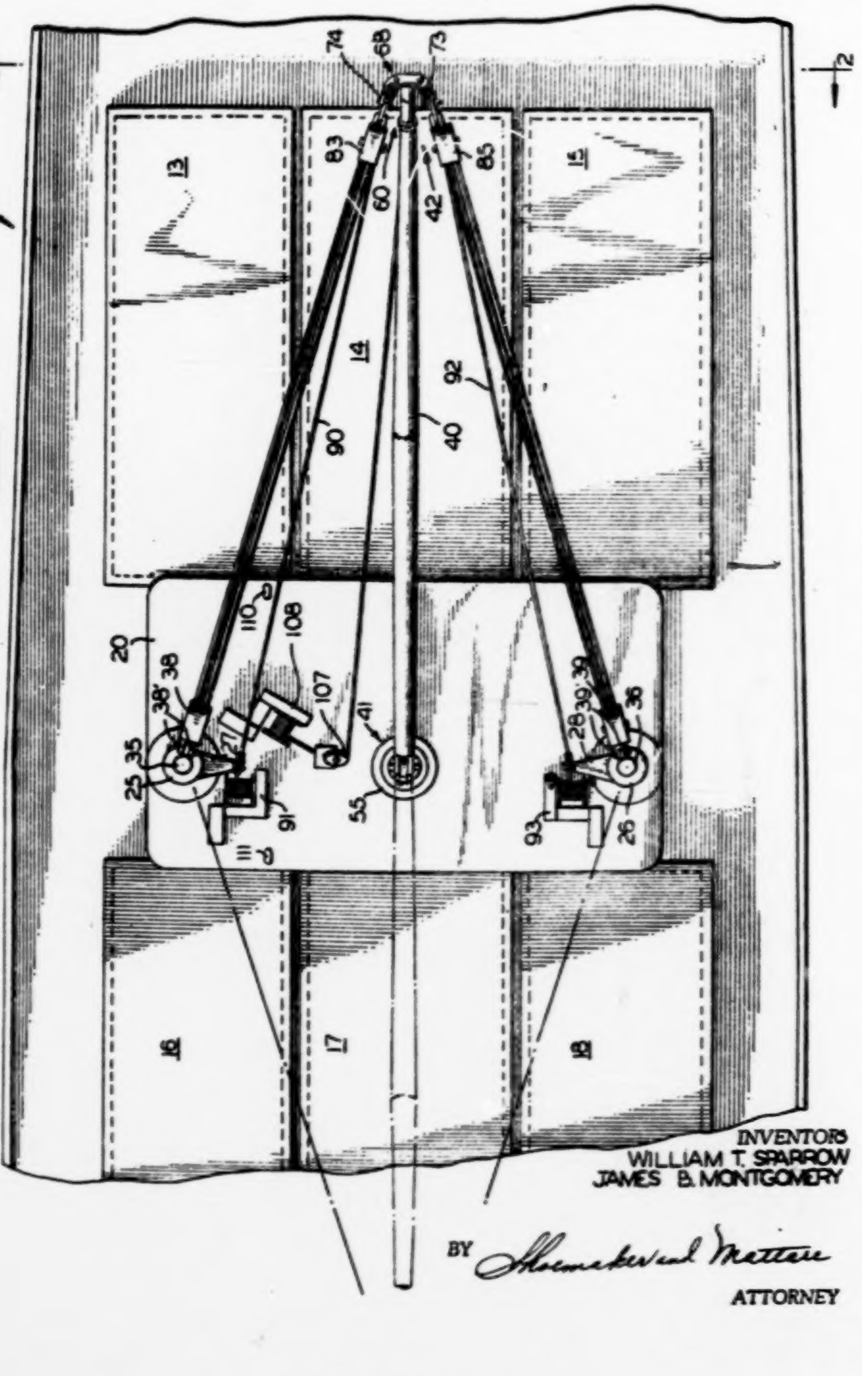
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FIG. 1

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Nov. 12, 1963 W. T. SPARROW ETAL 3,110,403

CARGO HANDLING APPARATUS

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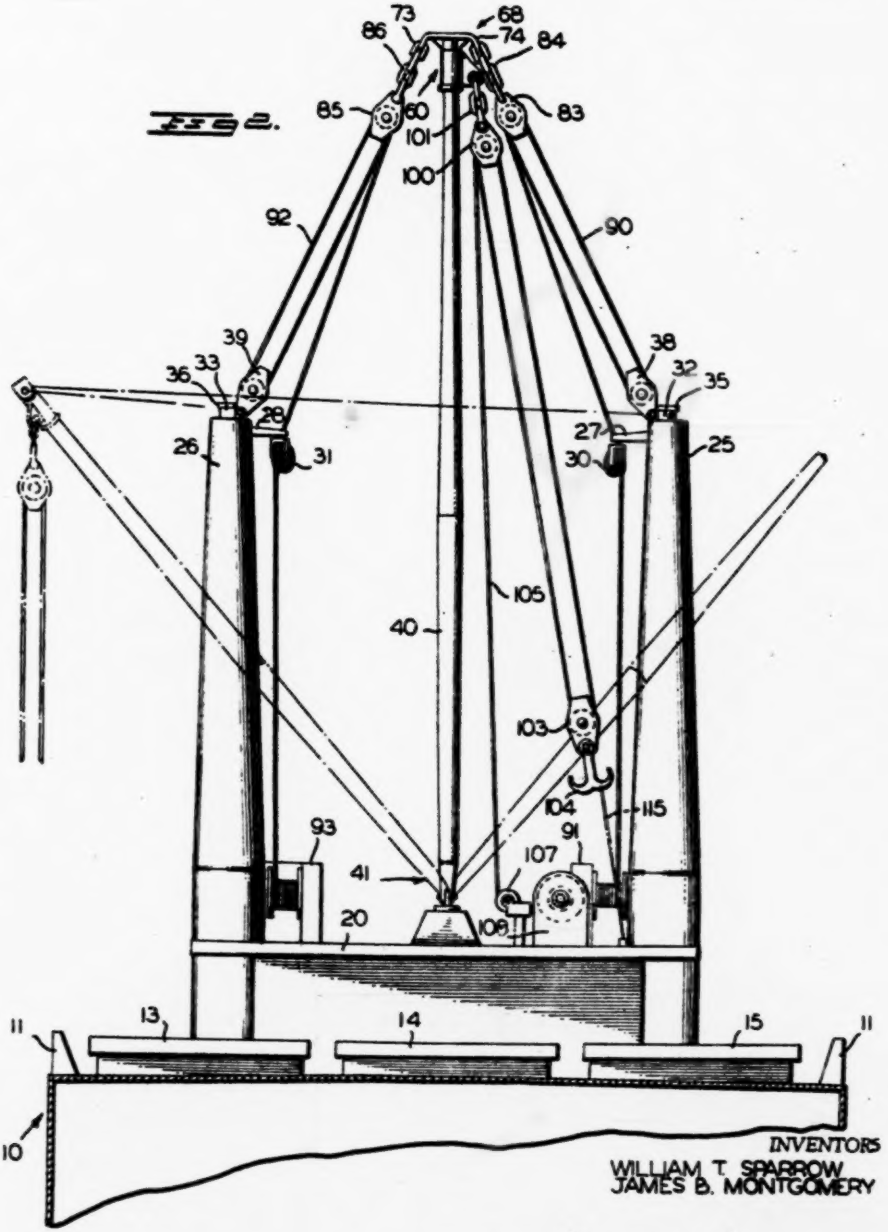
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FIG. 2.

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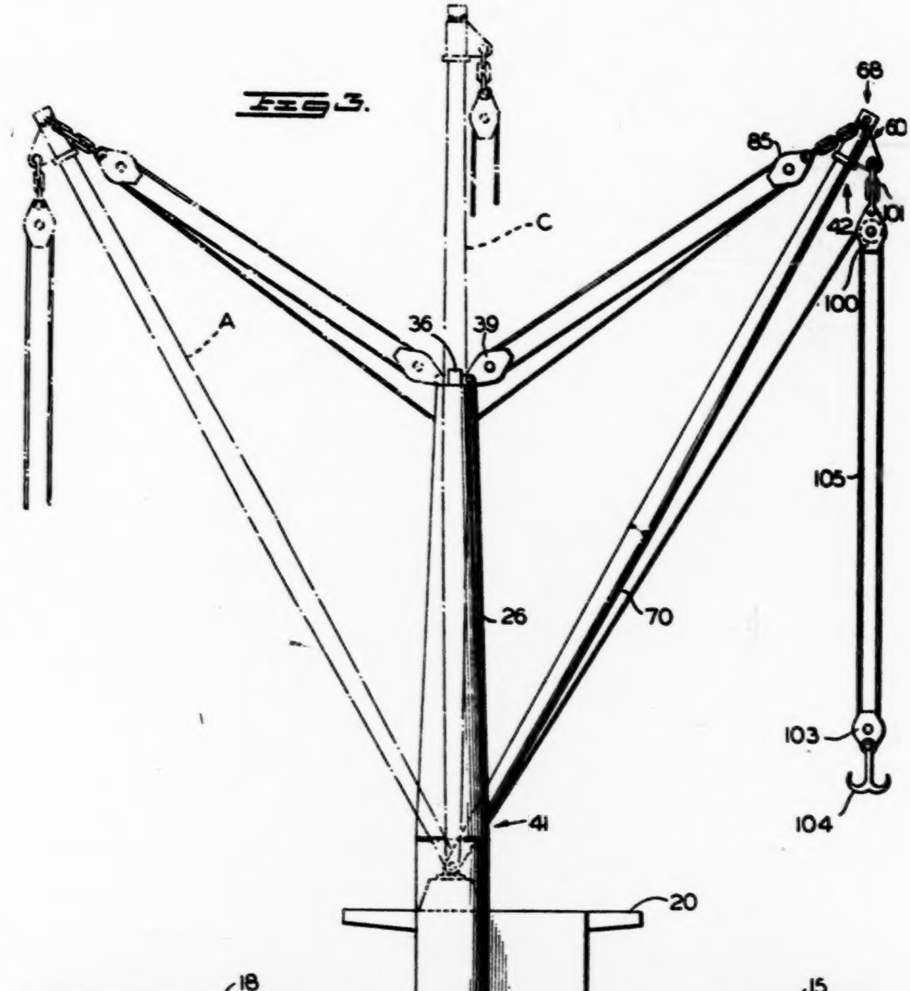
CARGO HANDLING APPARATUS

Filed Jan. 31, 1962 4 Sheets-Sheet 3

FIG. 3.


68
60
85
101
42
C
100
A
36
39
105
26
70
103
104
41
20
18
15

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Nov. 12, 1963 W. T. SPARROW ETAL 3,110,403

CARGO HANDLING APPARATUS

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Fig 5.

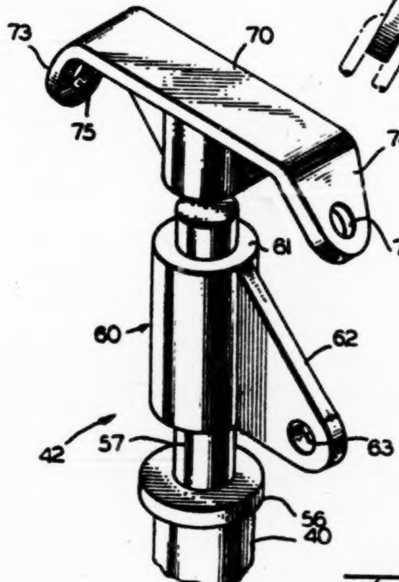
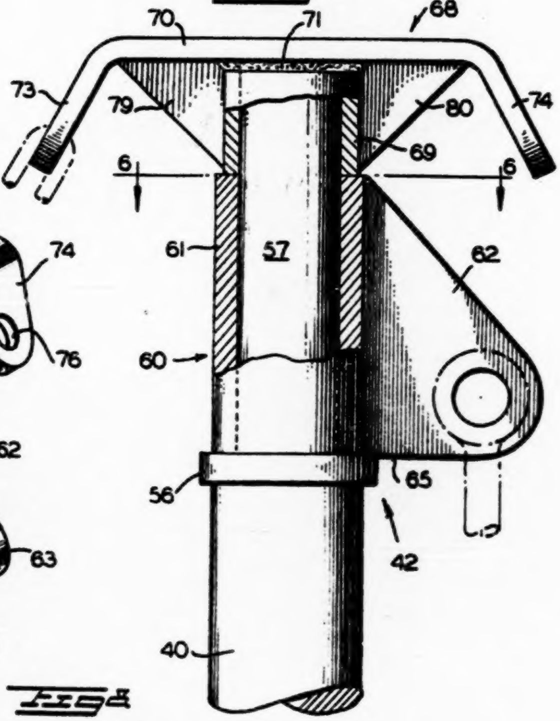

73
70
75
74
76
61
60
62
42
57
63
56
40

Fig 4.


70
71
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73
79
80
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6
6
61
57
62
60
56
65
42
40

Fig 7.

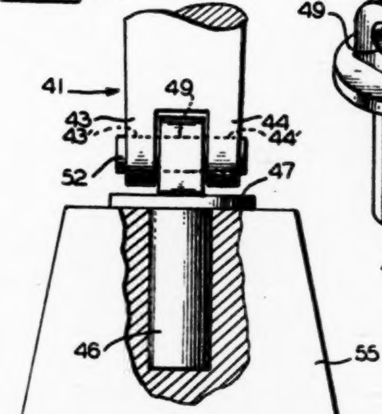
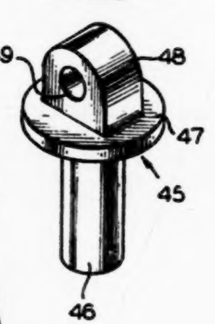

41
49
43
43'
44
44'
52
47
46
55

Fig 8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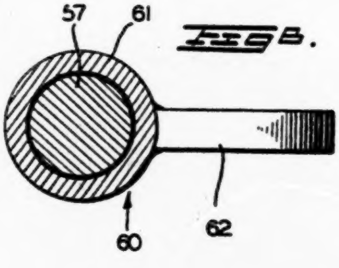
48
47
45
46

Fig 6.



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CARGO HANDLING APPARATUS

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11 Claims. (Cl. 212—3)

The present invention relates to new and novel cargo handling apparatus, and more particularly to heavy lift gear.

In addition to the conventional rig employed for loading and discharging cargo, cargo vessels are generally provided with a heavy lift or "jumbo" boom for handling cargo which is too heavy to lift with the regular ship's gear. Since this heavy lift gear adds top weight and is expensive to install and maintain, it is usually rigged at only one hatch of the ship. Sometimes provision is made for utilizing the same heavy lift gear at an additional hatch by dismantling the heavy lift gear, removing it, and then reassembling it. The extra fittings required for carrying out this procedure add to the weight and expense of the rig and the operation is very time-consuming.

Accordingly, it is desirable to provide an arrangement whereby the same heavy lift boom structure can be employed at more than one hatch, that is to say, at one hatch forward of the boom step and at another hatch aft of the boom step. Prior art arrangements have been provided for utilizing the same heavy lift boom at two different hatches without disassembling the gear, but such prior art arrangements require the use of special, complicated and expensive fittings and mechanisms, and further require careful coordination of operations when switching from one hatch to another.

The arrangement of the present invention provides a heavy lift boom arrangement which is constructed to be employed with equal facility at a hatch both fore and aft of the boom step. No special blocks or complicated mechanisms are required in the present invention, and a particular advantage of the arrangement herein disclosed is that equipment readily available in conventional rigs can be employed for shifting the boom for use at either hatch.

In the arrangement of the present invention, the heel of the boom is mounted for substantially universal movement, and a topping lift attachment means is rigidly secured to the head portion of the boom, this attachment means being swivelly connected to a topping lift which is in turn connected with topping lift blocks supported at the upper ends of the king posts of the mast structure. The arrangement is such that the heavy lift boom can be swung fore and aft through a plane extending through the longitudinal axes of the king posts.

The cargo fall of the present invention includes an upper purchase block which is supported from a cargo fall support means mounted at the head portion of the boom. This cargo fall support means is rotatably mounted with respect to the boom and is axially fixed with respect thereto. This permits the cargo fall support means to be swung from side to side of the boom such that in moving from one hatch to another, the cargo support means can be swung through an angle of 180° for disposing the upper purchase block in proper operative position with respect to the boom over either of the two hatches with which the boom is employed.

The boom can be readily swung through the aforedescribed plane and the cargo fall support means rotated by attaching a pendant to the cargo hook and pulling the hook and lower purchase block through between the king posts, the pendant being lead through a guide in the

form of a padeye or the like and thence to a winch or other suitable means for applying the necessary force to the pendant.

A particular advantage in the operation of the device when moving from one hatch to the other is that it is only necessary to operate the topping gear while the hoisting gear remains idle. The apparatus is easily operated with a minimum of effort and with very little chance of damage due to mishandling or improper maintenance, and furthermore, replacement parts are readily available.

An object of the present invention is to provide cargo handling apparatus including a heavy lift boom arrangement constructed so as to be used with two different hatches, one forward and one aft of the boom step.

Another object of the invention is the provision of new and novel cargo handling apparatus including a heavy lift boom wherein no special blocks or complicated mechanisms are required.

A further object of the invention is to provide cargo handling apparatus including a heavy lift boom wherein the hoisting gear may remain idle when moving the boom from a position to operate with one hatch to a position to operate with another hatch.

Still another object of the invention is to provide cargo handling apparatus including a heavy lift boom arrangement which may be easily operated with a minimum of effort with little chance of damage from mishandling or improper maintenance and wherein replacement parts may be readily obtained.

A still further object of the invention is the provision of cargo handling apparatus which is relatively simple and inexpensive in construction, and yet which is sturdy, reliable and efficient in use.

Other objects and many attendant advantages of the invention will become more apparent when considered in connection with the specification and accompanying drawings, wherein:

FIG. 1 is a plan view of the apparatus according to the present invention as mounted on a ship;

FIG. 2 is an end view of the apparatus shown in FIG. 1 taken along line 2—2 of FIG. 1, looking in the direction of the arrows in an intermediate position wherein the boom apparatus is being moved from a position over one hatch to a position over the other hatch;

FIG. 3 is a side view of the apparatus shown in FIG. 1 with the winch mechanism removed;

FIG. 4 is a view partly in section through the outer end portion of the head of the boom and illustrating the details of construction of the topping lift attachment means and the cargo fall support means;

FIG. 5 is a perspective exploded view illustrating the manner of assembly of the components shown in FIG. 4;

FIG. 6 is a sectional view taken substantially along line 6—6 of FIG. 4 looking in the direction of the arrows;

FIG. 7 is a view partly broken away illustrating the mode of mounting the heel portion of the boom; and

FIG. 8 is a perspective view of one of the components shown in FIG. 7.

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, as seen most clearly in FIGS. 1–3, a portion of a cargo ship is indicated generally by reference numeral **10**, the upper deck of the ship having the usual bulwarks **11** extending fore and aft at the sides of the deck, a forward hold having three hatch covers **13**, **14** and **15** disposed thereover, and an aft hold having three hatch covers **16**, **17** and **18** disposed thereover.

A winch house **20** is disposed between the fore and aft hatches and serves to support the heavy lift gear mechanism hereinafter described. It should be understood that the usual ship's gear for loading and discharging cargo would also be mounted on and adjacent to the winch house, but the conventional gear has been eliminated from the drawings for the sake of simplicity in order that the heavy lift boom mechanism may be more readily understood. For example, the conventional gear which may be employed along with the heavy lift boom mechanism as shown herein may be of the type as shown in "Marine Cargo Operations" by Charles L. Sauerbier, published by John Wiley & Sons, copyrighted 1956.

A pair of king posts **25** and **26** extend upwardly from the winch house **20**, the king posts being spaced apart athwartships as shown particularly in FIG. 1, and being of a symmetrical tapered configuration as indicated in FIG. 2.

A pair of laterally inwardly projecting lead block brackets **27** and **28** are provided, these lead block brackets being respectively fixed to the upper end of king posts **25** and **26**. Single topping lift lead blocks **30** and **31** are movably supported from brackets **27** and **28** respectively.

A pair of swivel members **32** and **33** are rotatably supported on upwardly extending journal portions provided at the top of the king posts **25** and **26** respectively, the king posts including cap plate members **35** and **36** respectively which extend in overlying relationship to the journal portions for retaining the swivel member in operative position as shown. A pair of multiple sheave topping lift king post blocks **38** and **39** are provided, these blocks each including a pair of spaced integral ears **38'** and **39'** respectively, these ears being pivotally supported by the outwardly projecting end portions of swivel members **32** and **33** respectively, whereby these blocks are pivotally supported by the respective swivel members which are in turn rotatably supported at the upper ends of the king posts.

A heavy lift boom **40** is provided, this boom being provided with a lower or heel portion indicated generally by reference numeral **41**, and an upper or head portion indicated generally by reference numeral **42**. The boom is mounted such that the lower or heel portion thereof is substantially universally mounted, and as seen particularly in FIG. 7, the heel portion of the boom is bifurcated so as to provide two downwardly extending spaced portions **43** and **44** having bores **43'** and **44'** formed therethrough respectively. A boom support member as seen particularly in FIG. 8 indicated generally by reference numeral **45** is provided with a downwardly extending substantially cylindrical shank portion **46**, an outwardly extending annular flange **47** being formed at an intermediate portion thereof, and an upwardly extending portion **48** being provided with an opening **49** extending completely therethrough.

As seen in FIG. 7, a heel pin **52** is supported within the aligned openings **43'**, **44'** and **49** for pivotally supporting the boom about the axis of the heel pin. In addition, the shank portion **46** of the support member is rotatably supported within a recess provided in the boom pedestal **55**, and accordingly, the support member **45** is adapted to rotate about the vertically extending longitudinal axis thereof with respect to the boom pedestal.

As will be noted particularly in FIG. 1, the boom pedestal is disposed at a central portion of the winch house **20**, and the vertical axis of rotation of support member **45** is disposed along a center line passing through the longitudinal axes of the two king posts **25** and **26**. It will also be understood that the horizontal boom heel pin axis is centered about the vertical axis of support member **45**.

Referring now to FIGS. 4 and 5, the head portion **42** of the heavy lift boom is shown, and an enlarged annular collar **56** is formed on the boom, the outermost end portion **57** of the boom being of reduced diameter. A cargo fall support means or sleeve **60** is provided, this sleeve including a main tubular portion **61** which has a bore therethrough adapted to snugly receive the reduced portion **57** of the boom, whereby the support means is adapted to rotate about the longitudinal axis of the boom. Formed integral with the main tubular body portion **61** is a laterally extending pad **62** having an opening **63** provided through the outer portion thereof for supporting the upper purchase block hereinafter described.

As seen in FIG. 5, when assembling the apparatus at the head portion of the boom, the cargo fall support means **60** is slipped over the reduced end portion **57** of the boom and slid thereon to a point such that the lower edge portion **65** thereof engages the annular collar **56** formed on the boom, thereby limiting axial movement of the support means.

A topping lift attachment means indicated generally by reference numeral **68** comprises a tubular body portion **69** having a bore therein which snugly receives the outermost part of the reduced end portion **57** of the boom, a main spinning plate member **70** being secured as by welding indicated at **71** to the outermost end portion of tubular body portion **69**, plate **70** being elongated as particularly seen in FIG. 5 with a pair of angularly spaced ears **73** and **74** at the opposite ends thereof, these ears being provided with openings **75** and **76** formed therethrough respectively.

In order to reinforce and strengthen the structure of the topping lift attachment means, a pair of gusset plates **79** and **80** are welded between the outer surface of tubular body portion **69** and the under surface of plate member **70**. After having placed the cargo fall support means **60** in operative position as aforedescribed, the topping lift attachment means **68** is slipped over the outermost end of the reduced portion **57** of the boom and then suitably secured in operative position as by welding or any other suitable means.

After the completion of this assembly, it is apparent that member **68** is fixed to the outer end of the boom while member **60** is fixed against axial movement with respect to the boom since the lower end of tubular portion **69** of the member **68** is adjacent the upper end of the tubular portion **61** of member **60**, while member **60** is additionally free to rotate with respect to the boom about the longitudinal axis of the boom.

It is also important to note that the topping lift attachment means **68** is disposed such that the longitudinal axis of member **68** is parallel with the axis of the boom heel pin **52** and furthermore, fitting **68** is symmetrical about a plane passing through the boom axis and the boom heel pin axis. A multiple sheave topping lift boom head block **83** is connected by means of a chain **84** to ear **74** of fitting **68**, and a similar multiple sheave topping lift boom head block **85** is connected by means of chain **86** to ear **73** of fitting **68**. It is apparent that chains **84** and **86** will serve to swivelly connect the associated blocks **83** and **85** to the associated ears of fitting **68**.

A topping lift cable **90** is reeved through topping lift blocks **38**, **83** and **30** and passes downwardly and is connected either to a topping winch **91** or through a fair lead and thence to the winch. A topping lift cable **92** is reeved through topping lift blocks **39**, **85** and **31** and to a second topping winch **93** or through a suitable fair lead and thence to the topping winch. It is apparent that the topping lifts are attached to the tops of the king posts in such a manner that it will provide a wide range of operation from forward-and-outboard through any inboard angle to aft-and-outboard.

In operation, either fore or aft of the king posts, the boom is handled just like a conventional split topping rig, and it will be seen that in FIG. 1, the boom is disposed over the forward hatch.

As seen particularly in FIGS. 2 and 3, an upper purchase block **100** is supported by suitable means such as a chain or the like **101** from the pad **62** of the cargo fall support means **60**. A lower purchase block **103** has supported therefrom a conventional cargo hook **104**, and a cargo fall cable **105** is reeved through the upper and lower purchase blocks and thence downwardly through a cargo purchase lead block **107** to a cargo winch **108**. It will be noted that the cargo purchase lead block is disposed abreast the heel of the boom and is disposed substantially along a center line extending between the longitudinal axes of the king posts. A pair of guide means **110** and **111** which may be in the form of padeyes or the like are secured to the upper surface of the winch house, guide means **110** being disposed at the forward end of the house and guide means **111** being disposed at the aft end of the house. It will be noted as seen in FIG. 1 that these guide means **110** and **111** are disposed on opposite sides of a plane extending through the longitudinal axes of the king posts, and it will be further noted that the guide means are offset laterally, that is to say, to the port side of the heel portion of the boom, the cargo purchase lead block **107** also being offset laterally on the same side of the heel portion of the boom.

Assuming that the heavy lift boom is initially employed for loading and unloading with respect to the forward hatch, and it is desired to shift the boom such that it can be operated in conjunction with the aft hatch, the topping lift mechanism is utilized to swing the boom toward the plane passing through the axes of the king posts, and the boom is topped as high as possible, utilizing the topping lift gear, the hoist gear being idled during this operation. A pendant or other suitable means is then attached to the cargo hook, this pendant being indicated by phantom line **115** in FIG. 2. The pendant is then preferably passed through the guide means **111** and thence to a winch or other suitable means. Then, by pulling on the pendant the cargo hook is pulled through between the boom and king post **25**, that is to say, the cargo hook is swung around on the same side of the boom as the cargo purchase lead block. By so pulling on the pendant, the cargo fall support means **60** will be rotated through an angle of approximately 180°, and the boom head will pass over dead center through the plane passing through the longitudinal axes of the two king posts, and the boom mechanism will then be in position to be lowered on the aft side of the king post for operating with the aft hatch, it being evident that the cargo purchase blocks will then be in the proper working position below the boom.

In moving the boom back again for operation with the forward hatch, the procedure is reversed, the boom first being topped as high as possible from the aft hatch, a pendant then being attached to the cargo hook, and the pendant then being passed through guide means **110** and thence to a winch or the like. Pulling on the pendant will then serve to pull the cargo hook and lower purchase block back between the boom and king post **25**, the cargo fall support means **60** again rotating through an angle of approximately 180° and the boom moving back over dead center to the forward side of the king posts.

It is important to note that during movement of the boom from a forward to an aft position and vice versa, it is merely necessary to operate the topping lift gear, while the hoisting gear remains idle. This eliminates the necessity of providing any coordination of operation of the hoisting and the topping lift gears during the shifting process.

It will also be noted that FIG. 2 indicates the position of the components during movement of the cargo hook and lower purchase block from one side to the other, with the cargo fall support means **60** being shown in the position it occupies after rotating approximately 90°.

The phantom line positions shown in FIG. 2 indicate outboard positions of the boom.

FIG. 3 illustrates in solid lines the position of the boom over the forward hatch, while the position indicated by phantom line C indicates the approximate dead center line of the boom, phantom line position A of this figure illustrating the position of the boom in overlying relationship to the aft hatch.

In addition to the specific arrangement shown, it will be apparent to one skilled in the art that the rig as described above can be modified to permit the use of dual leads from the upper cargo purchase block to two winches, or to permit the use of an upper cargo lead block near the upper cargo purchase block.

It is apparent from the foregoing that there is provided new and novel cargo handling apparatus including a heavy lift boom construction which may be utilized with two hatches, one of the hatches being disposed forward of the boom step and one of the hatches being disposed aft of the boom step. No special blocks or complicated mechanisms are required for operating and shifting the boom mechanism, and the hoisting gear remains idle while the boom is being shifted from a forward to an aft position and vice versa. The components necessary for operating the structure are readily available, and the arrangement may be easily operated with little chance of damage from mishandling or improper maintenance.

Replacement parts are, of course, readily available for this type of apparatus. The over-all structure is quite simple and inexpensive in construction, and yet is sturdy, reliable and efficient in use.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

We claim:

1. Cargo handling apparatus comprising a mast structure, a heavy lift boom having a heel portion and a head portion, means mounting the heel portion of the boom for substantially universal movement, topping lift means connected between said mast structure and said boom, cargo fall support means mounted at the head portion of said boom, said cargo fall support means being movably mounted with respect to said head portion, and cargo fall means supported by said cargo fall support means, and means for receiving and guiding a portion of said cargo fall means and being offset laterally on only one side of said boom to permit the boom to be moved into any operative position without removing the cargo fall means from the associated receiving and guiding means.

2. Cargo handling apparatus comprising a mast structure including a pair of spaced king posts, a heavy lift boom having a heel portion and a head portion, means universally mounting the heel portion of the boom between said king posts for movement about vertical and horizontal axes, topping lift attachment means fixedly connected to the head portion of said boom, topping lift means connected between said mast structure and said topping lift attachment means, cargo fall support means mounted at the head portion of said boom and being rotatable with respect to said boom, and cargo fall means supported by said cargo fall support means, and means for receiving and guiding a portion of said cargo fall means and being offset laterally on only one side of said boom and disposed substantially on a center line between said king posts.

3. Cargo handling apparatus comprising mast structure including a pair of spaced king posts, a heavy lift boom having a heel portion and a head portion, means mounting said heel portion substantially on a center line extending between said king posts for substantially universal movement, topping lift attachment means fixedly secured to the head portion of said boom, topping lift means connected between said king posts and said topping lift attachment means, cargo fall support means mounted at the head portion of said boom and being

rotatably mounted with respect to the boom but axially fixed with respect thereto, and cargo fall means supported by said cargo fall support means.

4. Apparatus as defined in claim 3 including a cargo purchase lead block for receiving and guiding a portion of said cargo fall means, said cargo purchase lead block being disposed abreast the heel portion of the boom and substantially on a center line between said king posts.

5. Cargo handling apparatus comprising mast structure including a pair of spaced king posts, a heavy lift boom having a heel portion and a head portion, said boom being pivotally supported on a heel pin and being mounted for pivotal movement about the heel pin axis, said heel pin being mounted for swinging movement about a vertical axis to provide a universal mounting for said boom, topping lift attachment means fixedly mounted at the head portion of said boom and being substantially symmetrical about a plane passing through the longitudinal axis of the boom and the boom heel pin axis, topping lift means connected between said king posts and opposite end portions of said topping lift attachment means, cargo fall support means mounted at the head portion of said boom adjacent said topping lift attachment means and being mounted for rotation with respect to said boom about the longitudinal axis of the boom, and cargo fall means supported by said cargo fall support means.

6. Apparatus as defined in claim 5, including a cargo purchase lead block for receiving and guiding a portion of said cargo fall means, said cargo purchase lead block being mounted substantially on a center line extending between said king posts.

7. Apparatus as defined in claim 6, including a pair of guide means disposed on opposite sides of a plane extending through the longitudinal axes of said king posts, said guide means being offset laterally with respect to said boom on the same side as said cargo purchase lead block.

8. Cargo handling apparatus comprising mast structure including a pair of spaced king posts, a lead block bracket secured to the upper end portion of each of said king posts, a topping lift lead block movably mounted on each of said brackets, a topping lift swivel rotatably mounted at the upper end portion of each of said king posts, a topping lift block movably supported by each of said swivels, a heavy lift boom having a head portion and a heel portion, means mounting the heel portion of said boom substantially along the center line extending between said king posts for substantially universal movement, topping lift attachment means secured to the head portion of said boom and fixed against rotation relative thereto, a topping lift block swivelly connected to each opposite end portion of said topping lift attachment means, topping lift means reeved through said topping lift blocks, cargo fall support means mounted at the head portion of said boom and being rotatable with respect to said boom about the longitudinal axis of said boom and being axially fixed with respect to said boom, and cargo fall means supported by said cargo fall support means.

9. Apparatus as defined in claim 8, wherein said cargo fall means includes an upper purchase block supported by said cargo fall support means, a lower purchase block supported from said upper purchase block, a cargo hook supported by said lower purchase block, and a cargo purchase lead block receiving and guiding a portion of said cargo fall means, said cargo purchase lead block being mounted laterally of the heel of said boom substantially along a center line extending between said king posts.

10. Apparatus as defined in claim 9, including a pair of guide means for receiving and guiding a pendant adapted to be attached to the cargo hook for transferring the boom from one side to the opposite side of a plane extending through the longitudinal axes of said king posts, said guide means being disposed on opposite sides of said plane and being offset laterally of the heel of the boom on the same side of the heel of the boom as the cargo purchase lead block.

11. Cargo handling apparatus comprising a ship having a winch house disposed at the upper portion thereof and including a first hatch disposed forwardly of said house and a second hatch disposed aft of said housing, a pair of king posts extending upwardly from said house and being spaced athwartships, a lead block bracket fixed at the upper end portion of each of said king posts, a topping lift lead block movably supported by each of said lead block brackets, a topping lift swivel rotatably mounted at the upper end portion of each of said king posts, a topping lift block movably supported by each of said swivels, a heavy lift boom having a head portion and a heel portion, said heavy lift boom being supported by said house and being mounted at its heel portion for substantially universal movement on a center line extending between said king posts, a topping lift attachment means secured to the head portion of said boom and fixed against rotation relative thereto, a topping lift block swivelly connected to each end portion of said topping lift attachment means, topping lift means reeved through said topping lift blocks, a winch connected with said topping lift means and supported by said house for selectively operating same, cargo fall support means mounted at the head portion of said boom and being rotatably mounted with respect thereto and axially fixed with respect thereto, an upper purchase block supported by said cargo fall support means, a lower purchase block supported from said upper purchase block, a cargo hook supported from said lower purchase block, a cargo purchase lead block supported by said house and being disposed abreast the heel of said boom substantially along the center line extending between said king posts, cargo fall means reeved through said cargo blocks, a winch connected with said cargo fall means and being supported by said housing, and a pair of guide means for receiving a pendant attached to the cargo hook when moving the boom from one side of a plane passing through the longitudinal axes of said king posts to the other side of said plane, said guide means being disposed on opposite sides of said plane and being offset laterally of the heel of the boom on the same side as said cargo purchase lead block.

References Cited in the file of this patent

UNITED STATES PATENTS

2,914,193	Kohnenkamp ----------	Nov. 24, 1959

FOREIGN PATENTS

937,992	Germany -------------	Jan. 19, 1956
1,020,544	Germany -------------	Dec. 5, 1957